Roadsides

Collection no. 008 • Fall 2022

Infrastructure and the Animal

Edited by: **Emilia Róża Sułek** and **Thomas White**

ISSN 2624-9081

Table of Contents

Roadsides is a diamond Open Access journal designated to be a forum devoted to exploring the social, cultural and political life of infrastructure.

roadsides.net
editor@roadsides.net
@road_sides
@roadsides_journal

ISSN 2624-9081

University of Zurich[UZH]
Swiss National Science Foundation
UNI FR
UNIVERSITÉ DE FRIBOURG
UNIVERSITÄT FREIBURG

ISSN 2624-9081 • DOI 10.26034/roadsides-202200801

Introduction:
Infrastructure and the Animal

Thomas White and Emilia Sułek

In 1865 the Union Stock Yards opened in Chicago. This stockyard complex – the largest of its kind in the world – was financed by nine railroad companies, and became the key hub enabling the livestock of the American West to be rendered into commodities which were then transported by railroad to consumers in the country's eastern cities, and beyond. In his classic work, *Nature's Metropolis* (1991), the environmental historian William Cronon, writing before the crystallisation of infrastructure studies, called attention to the way animal lives were transformed by the railroad so that they became "abstract, standardized and fungible" (Cronon 1991: 259) across vast geographical distances. At the same time, the railroads that transported livestock across the USA also contributed to the disappearance of the wild bison, on which the Indigenous Peoples of the Great Plains depended, with sport hunters even gunning down the animals from the windows of moving trains. The railroad companies were more than happy to facilitate such pursuits, since bison wandering onto the tracks could cause significant disruption to the circulation of people and goods.

Why think of infrastructure in relation to nonhuman animals? The parallel emergence in recent years of the infrastructural and animal 'turns' in the social sciences does not in itself constitute a sufficient rationale for the juxtaposition enacted by this edited collection. However, our opening vignette suggests how the transformations in human–animal relations characteristic of modernity might be analysed in relation to the development of infrastructure. For the art critic John Berger (1980: 3), modernity heralded the marginalisation of animals, before which they had "constituted the first circle of what surrounded man." That we as authors, writing from cities in the UK and Switzerland, rarely encounter animals in our daily lives unless they are in plastic-wrapped pieces at the supermarket, is due to the fact that various infrastructures exist allowing animal lives and deaths to be processed out of sight (and sound, and smell). At the same time, in many parts of the infrastructure-saturated world, one of the main ways in which humans encounter wild animals involves their death as roadkill (Rigby and Jones 2022), and their abandonment at roadsides: marginalisation in a most literal sense.

Camel on road, Inner Mongolia, China.
Photo: Thomas White.

By drawing on a variety of ethnographic contexts, the contributions to this special issue question this equation of animal marginalisation and infrastructural modernity. And rather than thinking merely of what infrastructures do to animals, the contributors to our collection also reveal what animals do to and with infrastructures. In the process, they develop a conversation that has recently emerged among anthropologists and geographers on the entanglement of infrastructures and nonhuman life (e.g. Morita 2017; Barua 2021; McClellan 2021). In what follows, we propose why thinking with animals can be productive for scholars of infrastructure.

Anxieties of Circulation

Infrastructures, as "the architecture for circulation" (Larkin 2013: 328), are today central to the commodification of animals, and parts of animals, enabling the consumption of meat, for instance, to be removed in time and space from the visceral reality of slaughter. Yet the infrastructures that allow animals – parts and whole – to travel around the world are not just those of transportation; instead, the ability of animals to host viruses means that complex biosecurity infrastructures have emerged which seek to enable the movement of animal flesh, but prevent that of viruses (Blanchette 2020). In her contribution, Jiraporn Laocharoenwong shows how the extensive infrastructure that enables the transnational circulation of animals as commodities across the Thailand–Myanmar border, and onward to China, is dependent on the mundane work of care performed in privately run quarantine stations, often by migrant labourers.

The circulation of parts of animals afforded by infrastructure can also enable unwanted substances to enter the food chain. In Kyrgyzstan, where new roads have been constructed under the auspices of China's Belt and Road Initiative, Emilia Sułek describes local fears that *haram* donkey meat is being served at roadside restaurants – the byproduct of a wave of donkey rustling alongside Chinese-built roads to provide hides for the Chinese pharmaceutical industry.

Such fears exemplify the ambivalence with which infrastructural connectivity is often received on the ground, notwithstanding the modernist "promise" of infrastructure (Anand et al. 2018). Roads in particular can be regarded negatively as "a passageway for strangers" (Humphrey 2015: n.p.) or even the home of deadly spirits (Masquelier 2002). In rural Tibet, as described by Maria Coma in her article here, new roads not only make it easier to sell livestock for slaughter, but have also made this commodification more visible. In the context of deep ambivalence on the part of local Buddhist herders towards such commodification, roads have become "fraught spaces where the dilemmas of marketisation are made tangible."

Design for Life

One of the central insights that emerges from ethnographic considerations of infrastructures is that they do not always work as smoothly as their designers intend. Infrastructures, as complex assemblages of degrading materials, are subject to breakdown and disrepair (Schwenkel 2015; Joniak-Lüthi 2020). If studies have thus foregrounded questions of materiality, there has been less attention to the ways in which the liveliness (and lifelessness) of animals poses problems for those who design and manage infrastructure. The issue of roadkill, for example, suggests that questions of maintenance and decay in infrastructure studies could fruitfully be expanded beyond the material infrastructure itself to include the work that goes on in its immediate environment, such as dealing with the bodies of animals killed on roads. Gabriel Roos, in his article, reveals that in Switzerland such animals exist in a legal grey zone, with the result that the manner in which carcasses are disposed of depends largely on the decisions of individual gamekeepers.

On the way to the animal market, Osh-Bishkek highway, Kyrgyzstan.
Photo: Emilia Sułek, 2022.

In recent decades the scientific field of road ecology has emerged to study the ecological effects of linear infrastructure, and to propose solutions that seek to reconfigure the relationship between animals and infrastructure (see White 2020). Rather than simply fencing off infrastructures (and thereby disrupting animal mobilities), roads and railways now often feature underpasses or 'wildlife bridges' in their designs, a trend that Jonathan Metzger (2014: 208) has referred to as "more-than-human planning." In his contribution to this collection, Maan Barua suggests that such "reconciliation infrastructures" represent a shift in the biopolitical logic of conservation from confinement in protected areas to the modulation of nonhuman mobilities. While such infrastructures embody hopes for "a form of ecological peace, a settled frictionless order," Barua demonstrates how they can also reinstantiate forms of dispossession which have long accompanied conservation projects, as nonhuman mobility is privileged over the concerns of local farmers.

Reconciliation infrastructures also raise questions of epistemic politics. In her article, Simone Schleper discusses the case of the Trans-Alaska Pipeline System (TAPS), where caribou have come to be treated as a key indicator of ecosystem health. The apparent ability of caribou to become habituated to this infrastructure, evidenced in striking photographs which juxtapose the huge pipes with mothers and their calves, obscures other detrimental ecological effects of the TAPS. The "charisma" of certain species (Lorimer 2007) can thus become part of the "spectacle" of infrastructure (Schwenkel 2015).

Some infrastructures, however, unwittingly enable the flourishing of particular species, as these animals repurpose infrastructures in ways that are not accounted for by their human designers (Barua 2021). Drawing on archival research, Jack Greatrex shows how extractive infrastructures of British colonialism in Malaya facilitated the unwelcome movement of locusts, as well as constituting a habitat for these insects through the novel, recombinant ecologies that emerged along the sides of roads and railways.

Animals as Infrastructure

In various contexts across the world, nature is increasingly understood in infrastructural terms (Carse 2012; Wakefield 2020). Some of the articles in our collection suggest that this mode of infrastructural thinking might enable the emergence of new forms of urban cosmopolitanism, as people learn to live alongside, and even value, certain animals once classified as pests. Nevertheless, this hospitality remains one which privileges human management of the Earth (van Dooren 2016), even if it relinquishes some of the modernist desire for control and the purification of nature and society (Latour 1993).

Ognjen Kojanić discusses how the proliferation of golden jackals on the outskirts of Belgrade is represented in the media as a problem of irresponsible citizens who fail to properly dispose of their rubbish. Yet such representations obscure systemic issues with waste infrastructure in the city; instead, Kojanić suggests that alternative descriptions of these animals as helpful "hygienists on duty" indicate the possibility of a "multispecies infrastructure of waste." Such potential is beginning to be recognised in some cities. Drawing on research in Amsterdam, Herre DeBondt and Rivke Jaffe describe transformations in the way rats are understood: from unhygienic "epidemic villains" (Lynteris 2019) antithetical to urban modernity, which had to be removed from sight by waste infrastructure, to useful "waste workers" who consume the "fatbergs" that can block sewage pipes.

Of course, animals have long lived alongside humans because they worked alongside humans. However, the railroads that began transporting animals as flesh eventually led to a decline in many parts of the world in the use of animals as transport; indeed, the obsolescence of animal power, and its replacement by transport infrastructure, is central to narratives of progress. But the global distribution of such infrastructure is uneven. At many "infrastructural frontiers" (Schouten and Bachmann 2022), where paved roads give way to rough terrain, working animals continue to be important, both economically and politically. In northern Myanmar, as explained by Jacob Shell's piece, elephants play a significant role in amber prospecting and extraction, while also enabling forms of "subversive mobility" (Shell 2015) which keep the state at bay. As climate change renders infrastructures across the world increasingly vulnerable to the dynamic materiality of terrain, confident teleologies of animals and infrastructural modernity might have to be rethought.

The papers in this volume were presented at a workshop that took place from 14 to 17 September 2022, in Fribourg, Switzerland. The organisation of the workshop was possible thanks to generous support of the Swiss National Science Foundation and the University of Fribourg, as well as the passionate engagement of many colleagues, discussants and presenters. We would like to thank all participants as well as the peer reviewers across the globe who contributed to the final shape of this publication. The unique expertise of Henryk Alff, Maan Barua, Alex Blanchette, Joseph Bristley, Jacob Doherty, Richard Fraser, Sonika Gupta, Colin Hoag, Muhammad Kavesh, Lilian Iselin, Agnieszka Joniak-Lüthi, Madlen Kobi, Anchal Kumari, Selcen Küçüküstel, Verena La Mela, Alessandro Rippa, Björn Reichhardt, Facundo Rivarola, Jasnea Sarma, Gertrude Saxinger, Christina Schwenkel, Zarina Urmanbetova, Michael Vine and Emily Yeh provided us with inspiration and valuable feedback. We also thank Verena La Mela for her cover

photograph, David Hawkins for his copy-editing as well as Chantal Hinni for the visual side of this special issue. Last but not least, we would like to express our gratitude to the editorial board and, particularly to Tina Harris and Agnieszka Joniak-Lüthi, for their enthusiastic support throughout the editing process.

References:

Anand, Nikhil, Akhil Gupta and Hannah Appel (eds.). 2018. *The Promise of Infrastructure*. Durham, NC: Duke University Press.

Barua, Maan. 2021. "Infrastructure and Non-Human Life: A Wider Ontology." *Progress in Human Geography* 45 (6): 1467–89.

Berger, John. 1980. *About Looking*. New York: Pantheon.

Blanchette, Alex. 2020. *Porkopolis: American Animality, Standardized Life & the Factory Farm*. Durham, NC: Duke University Press.

Carse, Ashley. 2012. "Nature as Infrastructure: Making and Managing the Panama Canal Watershed." *Social Studies of Science* 42 (4): 539–63.

Cronon, William. 1991. *Nature's Metropolis: Chicago and the Great West*. New York: Norton.

Humphrey, Caroline. 2015. "Spatial Conjunctions." *Anthropology of this Century* [Online]. http://aotcpress.com/articles/spatial-conjunctions/

Joniak-Lüthi, Agnieszka. 2020. "A Road, a Disappearing River and Fragile Connectivity in Sino-Inner Asian Borderlands." *Political Geography* 78: 1–11. https://doi.org/10.1016/j.polgeo.2019.102122

Larkin, Brian. 2013. "The Politics and Poetics of Infrastructure." *Annual Review of Anthropology* 42: 327–43.

Latour, Bruno. 1993. *We Have Never Been Modern*, translated by Catherine Porter. Cambridge, MA: Harvard University Press.

Lorimer, Jamie. 2007. "Nonhuman Charisma." *Environment and Planning D: Society and Space* 25 (5): 911–32.

Lynteris, Christos. 2019. "Infectious Animals and Epidemic Blame." In *Framing Animals as Epidemic Villains: Histories of Non-Human Disease Vectors*, edited by Christos Lynteris, 1–26. Cham: Palgrave Macmillan.

Masquelier, Adeline. 2002. "Road Mythographies: Space, Mobility, and the Historical Imagination." *American Ethnologist* 29 (4): 829–56.

McClellan, Kate. 2021. “Electric Refuge: The Shock of Animal Infrastructure.” *Roadsides* 6: 24–9. https://doi.org/10.26034/roadsides-202100604

Metzger, Jonathan. 2014. “The Moose are Protesting: The More-Than-Human Politics of Transport Infrastructure Development.” In *Planning Against the Political: Democratic Deficits in European Territorial Governance*, edited by Jonathan Metzger, Philip Allmendinger and Stijn Oosterlynck, 203–26. London: Routledge.

Morita, Atsuro. 2017. “Multispecies Infrastructure: Infrastructural Inversion and Involutionary Entanglements in the Chao Phraya Delta, Thailand.” *Ethnos* 82 (4): 738–57.

Rigby, Kate and Owain Jones. 2022. “Roadkill: Multispecies Mobility and Everyday Ecocide.” In *Kin: Thinking with Deborah Bird Rose*, edited by Thom van Dooren and Matthew Chrulew, 112–34. Durham, NC: Duke University Press.

Schouten, Peer and Jan Bachmann. 2022. “Infrastructural Frontiers: Terrains of Resistance at the Material Edge of the State.” *Geoforum*. https://doi.org/10.1016/j.geoforum.2022.06.002

Schwenkel, Christina. 2015. “Spectacular Infrastructure and its Breakdown in Socialist Vietnam.” *American Ethnologist* 42 (3): 520–34.

Shell, Jacob. 2015. *Transportation and Revolt: Pigeons, Mules, Canals, and the Vanishing Geographies of Subversive Mobility*. Cambridge, MA: MIT Press.

van Dooren, Thom. 2016. “The Unwelcome Crows: Hospitality in the Anthropocene.” *Angelaki* 21 (2): 193–212.

Wakefield, Stephanie. 2020. “Making Nature into Infrastructure: The Construction of Oysters as a Risk Management Solution in New York City.” *Environment and Planning E: Nature and Space* 3 (3): 761–85.

White, Thomas. 2020. “Road Ecology.” *Society and Space* [Online]. https://www.societyandspace.org/articles/road-ecology

---

Cite as:

White, Thomas and Emilia Sułek. 2022. “Introduction: Infrastructure and the Animal.” *Roadsides* 8: 1-8. https://doi.org/10.26034/roadsides-202200801

Thomas White is a Research Associate at the Department of Social Anthropology, University of Cambridge, and a member of its Mongolia and Inner Asia Studies Unit. He has conducted long-term fieldwork in the west of Inner Mongolia, China, where his research has examined the politics of pastoralism and culture in the context of state environmentalism, as well as the transformations accompanying infrastructure development in this archetypally remote region. His current research project explores the development of Mongolia's economic and geopolitical relationship with China as it manifests in the meat and livestock trade, looking in particular at problems of logistics, standards and animal disease.

Emilia Sułek is a social anthropologist with expertise covering political and economic anthropology in broadly understood Central Asia. As a member of the research project "ROADWORK: An Anthropology of Infrastructure at China's Inner Asian Borders" (https://www.roadworkasia.com) funded by the Swiss National Science Foundation, she has been working on the unexpected side-effects of current infrastructural investments in Kyrgyzstan. In her earlier work, Emilia was interested in reconsidering the impact of medicinal fashions in China on the pastoral communities inhabiting the Tibetan plateau, which happens to be an important supplier of the Chinese pharmaceutical market. Her book, *Trading Caterpillar Fungus in Tibet: When Economic Boom Hits Rural Area*, was published by Amsterdam University Press in 2019.

ISSN 2624-9081 • DOI 10.26034/roadsides-202200802

Cattle Hotels and Infrastructures of Care

Jiraporn Laocharoenwong

The porous Thailand–Myanmar border has plenty of natural crossing points, which historically have enabled unofficial movements of goods and people (Van Schendel and De Maaker 2014). Yet it is not only humans and goods but also animals that cross. Each month, a steady stream of ten to twenty thousand cattle crosses the Moei River from Myanmar to Mae Sot in Thailand. On the Thai side, they have their health checked, are vaccinated and normally stay in quarantine for fifteen days. The twelve animal-quarantine stations as designated by the Department of Livestock along this part of the border are colloquially referred to as 'cattle hotels' (โรงแรมวัว).

In China, a growing affluent urban middle class has shifted towards a more protein-rich diet (Hansen and Gale 2014). A shortage of domestic supply to cater to this demand has driven a surge in beef imports. While imports of pre-cut premium beef for steaks from Australia or the Americas use well-documented supply chains, the cheaper beef that is typical of so many Chinese dishes, such as hotpot, stir-fries and noodle soups, is mostly imported as live cattle from Southeast Asia and then slaughtered in China.

In Myanmar, oxen used to work the fields until democratic elections in 2010 heralded a period of rapid economic growth (ADB 2012). Mechanization of agriculture caused the retirement of large herds of cattle. Matching surplus cattle to demand for beef in China, traders established several routes directly from Myanmar to China, or via Thailand (Smith et al. 2015). Not officially condoned for export in Myanmar and not officially sanctioned for import in China either – and notably also running through areas in Myanmar under the control of various ethnic armed groups – these trade routes are largely illegal but "licit," or "what people involved in transnational networks consider to be legitimate" (Abraham and Van Schendel 2005: 4). The Myanmar-to-China routes, however, proved problematic and their use has diminished. Even when the Myanmar government experimented with legalizing cattle exports in 2017, its designated route via the Muse–Ruili border crossing involved so much bureaucracy and uncertain passage through the territory of the Wa ethnic group that many official traders reverted back to the unofficial trade routes (Htoon 2020).

With their origins largely in Myanmar, cattle travel via Thailand and Laos to their destinations in China, and to a lesser extent Vietnam. Including time spent in quarantine and at fattening stations, the entire route can take around three to four months. Based on ethnographic research in Mae Sot, this article focuses on cattle hotels and their position in the larger beef supply chain and ruminant trade that spans Southeast Asia.

This ox, part of a herd of a hundred cattle, was transported from the temporarily closed Myanmar–China border crossing south to another crossing at the Myanmar–Thailand border. Photo: Jiraporn Laocharoenwong, 2022.

Because of the overall safer route and superior veterinary care in Thailand, Mae Sot has established itself as a central node in this trade, and its position has gained in importance over the past decade. It has become a chokepoint, where cattle must pass many health checks as part of strict animal disease control, and a major waiting area, where cattle and their traders have to spend 'idle' time due to the quarantine requirements. Cattle hotels, facilitating all these elements of control, waiting and care, have become an essential infrastructure of cattle trade routes from Myanmar to China.

Cattle Hotels and Food Infrastructures

Research into food supply chains as a type of infrastructure foregrounds that which is often taken for granted or largely invisible. The notion of "food infrastructures" (Penders et al. 2014) suggests the need to go beyond mere issues of supply, demand and markets. It prompts the exploration of implicit assumptions about what is safe or proper regarding storage, packaging and transport of food over long distance. It also interrogates the institutional arrangements and regulatory requirements involved.

A cattle hotel is built as a roofed animal pen, with designated areas for storage and veterinary inspection. Baan Rai cattle hotel.
Photo: Jiraporn Laocharoenwong, 2022.

For the live cattle trade another infrastructural aspect is crucial, because live commodities cannot simply be stored in a warehouse, nor can they be transported as fresh produce or packaged goods: they require care. Cattle hotels in Mae Sot form a nexus where food infrastructure, control and care fuse together. Having worked in the field, some cattle arrive scrawny or sick. During quarantine here, before being transported to resource-rich 'fattening' (ขุน) areas further inside Thailand, cattle can be fed and cured, and also made legal. When they enter Thailand, the livestock are declared 'dead' (ถูก

ทำให้ตาย) in Myanmar, as if slaughtered, and are 'reborn' (ชุบชีวิตใหม่) in Thailand, officially changing nationality from Burmese to Thai, with all the required documents. In order to obtain these documents, which allow traders to move cattle out of the border area and resume their journey, the Thai authorities require stringent health controls for all livestock – stipulations that were first introduced in 1995 to combat foot-and-mouth disease. This entails a significant amount of bureaucracy, which is difficult to navigate for both Myanmar and Thai traders.

Oxen sleeping in the Wang Takien cattle hotel.
Photo: Jiraporn Laocharoenwong, 2022.

Pun, a cattle hotel owner and former headman of Baan Rai Village, maintains good connections with both Thai authorities and several ethnic armed groups in Myanmar, through which he can arrange safe transport for cattle through insurgency areas, as well as facilitate customs checks and other dealings with bureaucracy for traders. Pun recognized that Mae Sot had become a node of connection in the trans-border cattle trade, where traders from Myanmar, Thailand, and occasionally observers from Vietnam and China come together. Sensing a business opportunity, Pun, and later others like him, started to offer more and more services facilitating the cattle's required longer stay, setting up cattle pens with a veterinarian on-site, providing fodder, clean water and hay for bedding. Thus, the term cattle hotel was coined.

All cattle hotels are private businesses. They compete in terms of the range of services offered, and in their effectiveness in organizing the border crossing itself. The details of the crossing vary, too. In some cases, the animals ford the river; in others, they walk onto a metal raft that brings them from the Myanmar to the Thai side. In yet others, a Myanmar truck will drive onto the raft and unload cattle at the Thai side right at the cattle hotel.

Metal raft on which the cattle cross the Moei River.
Photo: Jiraporn Laocharoenwong, 2022.

An Infrastructure of Disease Control, Waiting and Care

In early 2021, an outbreak of lumpy skin disease in Thailand caused thousands of cattle deaths (Arjkumpa et al. 2021). As a result, Thailand suspended cattle trade with Myanmar for a year. When trade resumed in 2022, even stricter livestock import laws were imposed along with a requirement for twenty-eight days of quarantine, instead of the usual fifteen.

These changes in disease control severely affected the cross-border economies, which employ not only the cattle traders and cattle hotel owners, but also other economic actors in several countries. These include diverse groups such as truck drivers, farmers and hay providers, companies operating fattening areas in Thailand, and boatmen transporting cattle from Laos into China. When trade resumed, more than five thousand cattle from all over Myanmar were waiting to cross the Thai border into Mae Sot each week. To resolve this congestion, cattle hotels had to enlarge their areas, expand services and update their licenses accordingly.

For cattle hotels, this meant more stress on their capacity. Additional complications occur if an animal gets ill: it cannot leave quarantine and it must be separated from the other animals. Some may die and need to be disposed of. It requires more capital investments, too, in terms of vaccination, shelter, fodder and payment for the workers. As extra services, hotels provided healthy formulas of concentrated and roughage feed, and care for the cattle's hoofs, since the animals have to stand for a long time and travel far.

A cattle sitter, a trader and a veterinarian preparing vaccines. Photo: Jiraporn Laocharoenwong, 2022.

During their twenty-eight days of waiting, cattle are looked after by 'cattle sitters' (คนเลี้ยงวัว). Their role is to provide fodder and water, clean the pens, take oxen out of their pen for a walk, and administer medicine and food supplements to keep them healthy. Most cattle sitters are ethnic Mon or Karen or other undocumented migrant workers from Myanmar, often with a family background in farming. Thong, a Mon cattle sitter, used to work as a wall painter in a suburb of Bangkok, but lost his job due to Covid-19. He initially came to Mae Sot on his way back to Myanmar, but the border was closed. He found a job as a sitter, where he typically takes care of about thirty to forty oxen at any one time. In an interview in February 2022 at Wang Takien cattle hotel, he described his duties as follows:

> *I check the cattle every day. If an animal doesn't eat or drink, I examine its tongue and wash it with salt water. A very sick ox, I will separate from its herd. Cattle are social animals, they need friends. Otherwise they feel lonely, refuse to eat and may even die. In the evening I hang mosquito nets. I also sleep in the cattle pen.*

Amid stringent control by Thai authorities, long cattle queues at the border, impatient traders, and conflicts between time-to-market and extended waiting times, everyone is aware that cattle themselves can become a carrier for infectious diseases, making various adjustments necessary. It is the porosity of the Thailand–Myanmar borderland which in the first place allowed the opening up of unofficial crossing points for this international trade. Yet in this borderland it is the Mae Sot cattle hotels that sustain this trade, offering important services in the field of control, waiting and care, and which are themselves part of a broader food infrastructure spanning multiple countries.

References:

Abraham, Itty and Willem van Schendel. 2005. "Introduction: The Making of Illicitness." In *Illicit Flows and Criminal Things: State, Borders and the Other Side of Globalization*, edited by Willem van Schendel and Itty Abraham, 1–37. Bloomington: Indiana University Press.

Arjkumpa, Orapun, Minta Suwannaboon, Manoch Boonrod, Issara Punyawan, Supawadee Liangchaisiri, Patchariya Laobannue, Chayanun Lapchareonwong, Chaiwat Sansri, Noppasorn Kuatako, Pawares Panyasomboonying, Ponkrit Uttarak, Noppawan Buamithup, Chalutwan Sansamur and Veerasak Punyapornwithaya. 2021. "The First Lumpy Skin Disease Outbreak in Thailand (2021): Epidemiological Features and Spatio-Temporal Analysis." *Frontiers in Veterinary Science*. https://doi.org/10.3389/fvets.2021.799065

ADB, Asian Development Bank. 2012. "Myanmar in Transition: Opportunities and Challenges." https://www.adb.org/sites/default/files/publication/29942/myanmar-transition.pdf

Hansen, James and Fred Gale. 2014. "China in the Next Decade: Reising Meat Demand and Growing Imports of Feed." *Amber Waves*, April. https://www.ers.usda.gov/amber-waves/2014/april/china-in-the-next-decade-rising-meat-demand-and-growing-imports-of-feed

Htoon, Kyaw Lin. 2020. "'At Least the Illegal Routes are Safe': Cattle Smuggling Makes a Comeback." XCEPT Research Report, 11 August.

Penders, Bart, David Schleifer, Xaq Frohlich and Mikko Jauho. 2014. "Preface: Food Infrastructures." *Limn* 4. https://limn.it/articles/preface-food-infrastructures/

Smith, Polly, Nancy Bourgeois Lüthi, Li Huachun, Kyaw Naing Oo, Aloun Phonvisay, Sith Premashthira, Ronello Abila, Phillip Widders, Karan Kukreja and Corissa Miller. 2015. "Movement pathways and market chains of large ruminants in the Greater Mekong Sub-Region." OIE Research Report. https://rr-asia.woah.org/wp-content/uploads/2019/10/livestock_movement_pathways_and_markets_in_the_gms__final_.pdf

Van Schendel, Willem and Erik de Maaker. 2014. "Asian Borderlands: Introducing their Permeability, Strategic Uses and Meanings." *Journal of Borderlands Studies* 29 (1): 3–9.

Cite as:

Laocharoenwong, Jiraporn. 2022. "Cattle Hotels and Infrastructures of Care." *Roadsides* 8: 9-16. https://doi.org/10.26034/roadsides-202200801

Jiraporn Laocharoenwong is a Lecturer at the Department of Anthropology and Sociology, Chulalongkorn University, Thailand. In 2020, she obtained her PhD from the University of Amsterdam, the Netherlands, for her thesis "Re-imagining the Refugee Camp: Sovereignty and Time-Space Formation Along the Thailand–Burma Borderland." Her current research includes a project on "Governing the Virus: Borders, Bio-power and Migrant Bodies in Thailand," and one on animals crossing borders and the politics of commodities, pathogens and human–animal relations in the Southeast Asian borderlands, with a grant from the National Higher Education Science Research and Innovation Policy Council (NXPO).

ISSN 2624-9081 • DOI 10.26034/roadsides-202200803

Donkey Selfies:
Chinese Roads in Kyrgyzstan

Emilia Sułek

"I came home from the field to have dinner and watch television. I left the donkey on the road. In the morning, I went out and the donkey wasn't there. It lay a few meters away, at the roadside. Its whole body, only the skin was missing." So Tokubek, a Kyrgyz farmer recalls the events of 2019. That year there were fourteen such cases in his village and hundreds across the country.

Between the launch of the Belt and Road Initiative (BRI) in 2013 and the beginning of the Covid-19 pandemic, Kyrgyzstan lost nearly fifty thousand donkeys (Stat.kg 2022). This accounts for more than half of the country's donkey population. Importantly, Kyrgyzstan is not the only country where donkey numbers have plummeted as Chinese infrastructure investments have increased, suggesting a connection between Chinese-led road building and the decline of donkeys. In this article, I shed light on this complex relationship, addressing a so-far unstudied aspect of China's growing global engagements.

Donkey (hide) Trade

In 2008, Kyrgyzstan and China signed a bilateral agreement on the export of donkeys. The BRI, a centerpiece of Xi Jinping's foreign policy, was launched five years later. However, neither the donkey trade nor Chinese investors were new in Kyrgyzstan. Donkeys had been sold to China prior to 2008 – even if data on this remains scarce – to meet the growing demand for donkey-derived products in the Chinese pharmaceutical industry. The latter is estimated to process nearly five million donkey hides per year, making a product called *ejiao* (Ch. 阿胶), marketed as a "beauty and wellness booster with anti-aging and health promoting properties" (Köhle 2018: 177; TDS 2019).

Chinese infrastructure investments in Kyrgyzstan also have a longer history, dating back to the 1990s. The BRI ideology sanctioned their presence in Kyrgyzstan and, more broadly, across Central Asia, which was now presented as a 'corridor' between China and Europe, the Near East and other markets. It raised the status of these infrastructure investments and made them internationally visible. In Kyrgyzstan, the real goals of BRI remain somewhat obscure to many Kyrgyz citizens, who can nevertheless easily identify which roads were 'built by the Chinese' (Kg. *Кытайлар салган жолдор*).

"They go as workers with us"* (Они ходят у нас как рабочие, *in Russian), explained a woman from the Ysyk-Köl region. This donkey replaced a stolen animal.
Photo: Emilia Sułek, 2021.

Since the launch of the BRI, the donkey population in Kyrgyzstan has declined by up to ten thousand animals per year (Kabar 2018). The numbers correspond with a general feeling that donkeys are vanishing from the rural landscape. These hard-working animals are a key source of draft power for farmers across Kyrgyzstan. At the same time, they are the least culturally valued. Neither an object of national pride (such as horses), nor of great economic value (like sheep or cows), donkeys are disappearing silently.[1]

[1] Donkeys reproduce slowly and are ill-suited for mass breeding. This explains concerns of global extinction (TDS 2019).

The decline in donkey numbers did eventually capture some attention. Kyrgyz First Deputy Prime Minister Kubatbek Boronov welcomed it as an index of Kyrgyzstan's improved economy, which remains the second-least successful in post-Soviet Central Asia, draws nearly one third of its GDP from personal remittances and features significant public debt to China (World Bank 2022). Boronov, in a 2020 speech to the parliament, said that the obsolescence of the donkey as a work animal shows that the population is becoming affluent. It is a natural consequence of improved road infrastructure. People drive cars now, he remarked (Maralfm 2020).

Is there, indeed, a causal relationship between these two overlapping phenomena: the declining numbers of donkeys and better road infrastructure? In the opinion of Tokubek, the farmer from Ysyk-Köl in eastern Kyrgyzstan, there is – though it is not the one posited by the Deputy Prime Minister. "As soon as the Chinese finished building the road, the problem ended," he recounted when I interviewed him in the summer of 2022. The road he referred to is the Bishkek–Balykchy section of the highway running to the Chinese border. Tokubek's village is seventy kilometers from Balykchy. Another highway, around the Ysyk-Köl lake, is currently under construction, closer to Tokubek's village. This project, however, is being realized by Kyrgyz companies and so it does not impact the donkey population, Tokubek said. It is only the 'Chinese roads' (Kg. *Кытай жолдор*) that do.

The temporal correlation between Chinese road-building and declining donkey numbers makes Kyrgyz citizens seek explanations. A common one says that it is the starvation-level wages that push Chinese road workers into donkey-eating. "Their pay is so low that they would eat anything," Tokubek suggested. His belief that the road workers are political or criminal convicts echoes the well-documented practices of forced labour and 're-education' camps for Uyghur citizens in China. Nearly two hundred thousand ethnic Kyrgyz live across the Chinese border, so news from China is followed in Kyrgyzstan with concern and is the cause of occasional protests (RFA 2018).[2] Another explanation refers to price differences between mutton, beef and horse meat, all considered *halal*, and donkeys, which are *haram*.[3] For people not bounded by the dietary rules of Islam, as some Kyrgyz say, eating donkeys might be a rational economic choice – albeit a reprehensible one.

[2] Some infrastructure projects from the Soviet period were also rumoured to rely on convict labor, e.g. the Töö Ashuu Tunnel on the Osh–Bishkek highway.

[3] In 2022, a donkey cost five thousand Kyrgyz som, a cow fifty thousand and a horse at least one hundred thousand. While prices can vary, the relative costs remain roughly stable.

Twenty Minutes

As with most other livestock in Kyrgyzstan, donkeys roam freely and can be easy prey for reportedly hungry road workers. In fact, in the BRI-decade donkey thefts became so common that police urged citizens to take selfies with their donkeys: these could be used as a confirmation of ownership, in case the stolen animal was found. Many donkeys, however, are not exactly stolen, but slaughtered and skinned on the spot – their carcass abandoned within walking distance of the village. The proportion of donkeys slaughtered and skinned to those stolen is difficult to estimate, but hundreds of carcasses discarded by the roadside across the country reveal that this is not an incidental phenomenon.

China has been buying animal skins from Kyrgyzstan for years, so its interest in donkey hides does not surprise local farmers. It is the loss of property and labour force that concerns them, and – on top of this – the question of what happens to donkey meat when it is not the road workers who eat it. The trade agreement between Kyrgyzstan and China implies that donkeys should be exported alive. Yet the skinning of donkeys within Kyrgyzstan has led to concerns over the fate of the rest of the carcass. Recent years have seen a series of scandals where donkey meat was discovered in licensed slaughterhouses (24.kg 2015). Rumours about restaurants serving donkey meat as beef and horse meat circulate (TopNews.kg 2015). This applies particularly to restaurants located along the new highways: these cater to hundreds of anonymous customers who have no time to investigate the ingredients of their meat-stuffed *samsa* or *lagman* noodles.

Donkeys sold to China are taken directly to Chinese building sites and mines – so report traders in Tokmok, a town on the Bishkek–Balykchy highway.
Photo: Emilia Sułek, 2022.

It takes twenty minutes to slaughter and skin a donkey, Tokubek claimed, at least for someone with the necessary skills. Would Chinese road workers possess these? Tokubek is under no illusions. "It's our boys who did it," he stated. In cases both of donkey theft and slaughter, it is often rural inhabitants themselves who feed the Chinese demand; sometimes they even get arrested for doing so. Tokubek drafted a portrait of a typical person involved: young, male, unmarried, in need of money to start a family or business. The sale of donkeys or their hides offers them a cash income – one that is ephemeral and rather unsustainable – which can be spent or used for investments.[4]

[4] In 2022, a donkey cost five thousand Kyrgyz som, a cow fifty thousand and a horse at least one hundred thousand. While prices can vary, the relative costs remain roughly stable.

The exact flows of the donkey trade between Kyrgyzstan and China remain largely unexamined. Despite the official legal status of donkey export, illegal activities flourish. This applies both to the ways in which animals are procured and how they leave the country. In May 2022, a major Kyrgyz state official, Tolon Yrsaliyev, was arrested for accepting seventy thousand USD to facilitate obtaining a permit for donkey export, showing that the trade is still very lucrative business (24.kg 2022).

"Everywhere animals disappear" states John Berger in his essay on modernity's marginalization of the animal enabled by technological inventions and infrastructures (1980: 26). The latter serve as a material metonym of modernity, a measure of progress towards a more advanced future (Appel 2018: 46). Deputy Prime Minister Boronov's words reveal his belief in this narrative of modernity as manifesting itself in the expansion of roads and the disappearance of the donkey. However, donkeys have neither become obsolete in Kyrgyz farming nor have they been exchanged for cars. They disappear because of their value for the pharmaceutical industry in China.

The humble donkey, work animal of smallholders and village farmers, does not fit with some politicians' vision of a modern, affluent society. Whether the donkey trade actually indicates a growing affluence is what the Deputy Prime Minister did not say: in 2020 he resigned from office. In rural Kyrgyzstan, it is the shortage of cash, combined with entrepreneurial skills and a new connectivity brought by 'Chinese roads' that spur this phenomenon. Allowing a new level of integration into the predatory capitalist economy of China, this connectivity has transformed the donkey into a cash-bringing commodity and a source of raw material, and has linked certain enterprising rural inhabitants to obscure trade networks which syphon Kyrgyz natural resources off to China.

References:

24.kg. 2015. "Kyrgyzstan: Could Donkey Meat Bring Down the Government?" https://24.kg/archive/en/bigtiraj/174798-news24.html/

24.kg. 2022. "Обещал помочь с вывозом ослов в Китай. Задержан советник замглавы кабмина." https://24.kg/proisshestvija/233648_obeschal_pomoch_svyivozom_oslov_vkitay_zaderjan_sovetnik_zamglavyi_kabmina/

Appel, Hannah. 2018. "Infrastructural Time." In *The Promise of Infrastructure*, edited by Nikhil Anand, Akhil Gupta, and Hannah Appel, 41–61. Durham, NC: Duke University Press.

Berger, John. 1980. *About Looking*. London: Bloomsbury.

Kabar. 2018. "Поголовье ослов сократилось в Кыргызстане, число других видов домашнего скота растет." https://kabar.kg/news/pogolov-e-oslov-sokratilos-v-kyrgyzstane-chislo-drugikh-vidov-skota-rastet-natcstatkom/

Köhle, Nathalie. 2018. "Feasting on Donkey Skin." In *Prosperity: China Story Yearbook 2017*, edited by Jane Golley and Linda Jaivin, 177–81. Canberra: ANU Press.

https://www.thechinastory.org/yearbooks/yearbook-2017/forum-conspicuous-consumption/feasting-on-donkey-skin/

Maralfm. 2020. “Эшек азайып, унаа көбөйдү. Элетте жашоо оңолдубу?” https://maralfm.kg/archives/403126

RFA. 2018. “Bishkek Protesters Rally Outside Chinese Embassy Against ‘Reeducation Camps’.” https://www.rferl.org/a/bishkek-protesters-rally-outside-chinese-embassy-against-reeducation-camps-/29667706.html

Stat.kg. 2022. *Кыргыз Республикасынын аймактарында малга жана үй канаттууларына санак жүргүзүүнүн жыйынтыгы*, 2016–2022. Кыргыз Республикасынын Улуттук статистика комитети. Бишкек.

TopNews.kg. 2015. “Видеорепортаж: Первый день рейда по столичным точкам общепита не обнаружил мясо ослов.” http://topnews.kg/news/view/videoreportazh-pervyj-den-rejda-po-stolichnym-tochkam-obshchepita-ne-obnaruzhil-mjaso-oslov

TDS, The Donkey Sanctuary. 2019. *Under the skin: Update on the global crisis for donkeys and the people who depend on them*. https://www.thedonkeysanctuary.org.uk/sites/uk/files/2019-11/under-the-skin-report-revised-2019.pdf

World Bank. 2022. “Personal Remittances, Received (% of GDP) – Kyrgyz Republic.” https://data.worldbank.org/indicator/BX.TRF.PWKR.DT.GD.ZS?locations=KG

Cite as:

Sułek, Emilia. 2022. “Donkey Selfies: Chinese Roads in Kyrgyzstan.” *Roadsides* 8: 17-22. https://doi.org/10.26034/roadsides-202200803

Emilia Sułek is a social anthropologist with expertise covering political and economic anthropology in broadly understood Central Asia. As a member of the research project “ROADWORK: An Anthropology of Infrastructure at China’s Inner Asian Borders” (https://www.roadworkasia.com) funded by the Swiss National Science Foundation, she has been working on the unexpected side-effects of current infrastructural investments in Kyrgyzstan. In her earlier work, Emilia was interested in reconsidering the impact of medicinal fashions in China on the pastoral communities inhabiting the Tibetan plateau. Her book, *Trading Caterpillar Fungus in Tibet: When Economic Boom Hits Rural Area*, was published by Amsterdam University Press in 2019.

ISSN 2624-9081 • DOI 10.26034/roadsides-202200804

On the Road to the Slaughterhouse

Maria Coma-Santasusana

A long truck rolls away from Tserang's winter house in Jamkhur Valley of Sogpo County, at the edge of the Tibetan Plateau.[1] The sheer size of the vehicle makes its movement slow and difficult on the narrow mountain road. It is late November 2018, and at this time of the year most of Jamkhur's pastoralists have returned from the autumn camps to their winter houses. Deba, Tserang's aunt and neighbour, is feeding the racehorses in their corral. At the sight of the truck, she whispers "*Om mani, om mani*" and blows softly in the direction of the vehicle, holding her open palm under her chin.[2] I understand from her gesture, and from the discomfort manifest in her face, that the truck is transporting livestock for slaughter. Deba explains that the truck carries the yaks which Tserang sold a few days ago. As a matter of fact, I was at Tserang's house when a couple of Hui men arrived in a black sedan car with tinted windows.[3] They came from the city of Linxia, in China's northwest Gansu Province, some two hundred kilometers away. Over tea and deep-fried bread, Tserang and his trade partners negotiated the price.

[1] All personal names are pseudonyms. Tibetan names and words are given in simplified pronunciation.
[2] The first three syllables of the Tibetan Buddhist mantra *Om mani padme hum*. Herders in Sogpo are Buddhist.
[3] Hui (Chinese-speaking Muslims) are important players in the livestock trade, acting as middlemen and slaughterhouse operators.

The dirt road leading to Jamkhur Valley on which the long, livestock-loaded truck maneuvered that morning had been renovated in summer, just few months before. Its new layer of compacted gravel had flattened out the bumps and holes that until then made the steep and tortuous trip to the valley a difficult journey, especially after heavy rain or snow. Concrete milestones with numbers painted in bright red now dotted the roadside, marking the integration of this road into a wider transport network. Lying in China's Qinghai Province, at an average altitude of 3,475 meters above sea level, Jamkhur is home to a little over twenty families of nomadic pastoralists who make a living raising yaks, sheep and horses.[4] Upgrading of the dirt road answered longstanding calls for better road conditions by the valley's inhabitants, who frequently travel to the nearby township seat and county town. However, new roads such as this have also become unsettling spaces which force pastoralists to confront the moral dilemmas of engagement with the market.

[4] Sogpo has the status of a Mongolian Autonomous County. On the unique Tibeto-Mongolian identity of the Sogpo population see Diemberger 2007 and Roche 2016.

Flock of sheep walking on a road in Sogpo County. Photo: Maria Coma-Santasusana, 2018.

The renovation of Jamkhur's 28km road to the nearby township seat is a rather humble intervention into the local transport network. After all, the road has not even been asphalted. But this is only one among many projects of road construction or renovation implemented in Sogpo County in recent years. For the past two decades, China's efforts to develop its western regions economically have strongly focused on built infrastructure. As part of state-led programs such as the Open Up the West campaign announced in 1999 or the Belt and Road Initiative which followed in 2013, China has invested massively in the development of transport and telecommunications in its western borderlands. In these ethnic minority-populated regions, roads are as much a state instrument of territorial consolidation as they are a promise of connectivity and economic development.

A herder prepares to capture the yaks to be sold after a driver arrives in his truck.
Photo: Maria Coma-Santasusana, 2018.

Roads allow pastoralists to pursue their herding activities while staying connected to township seats and county towns, which are important spaces for economic and social exchange, as well as for the provision of public services (Iselin 2014). Humans, though, are not the only travelers on these high-altitude roads. Yaks and sheep are also, more than ever before, being transported along them. Each year at the end of August, as the lush summer pastures start turning golden and the days become shorter, the plateau's roads grow busy with trucks heading to slaughterhouses in Tibetan county towns or, further away, Chinese cities. After summer's abundance, animals now reach their peak weight and fetch the highest prices. The livestock sale season commences in earnest and continues until the end of November.

Yak and sheep sales in pastoral Tibet have increased in parallel to the market integration of animal husbandry, a result of economic reforms implemented in China since the

1980s (Manderscheid et al. 2004). Development policies in the past four decades have strongly pushed for a particular vision of modernity that is predicated on turning herders into market subjects and livestock into commodities (Gaerrang 2015). However, the commodification of livestock has not followed a straight path: as documented in other pastoral contexts (Ferguson 1994; Hutchinson 1996), Tibetan herders too have been reluctant to sell their livestock. Studies in the 1990s showed that, in contrast to the growing sales of medicinal herbs and dairy products, the commodification of livestock remained limited. Besides the lack of road infrastructure and the resulting difficulties of accessing markets, scholars point to herders' views of a large herd as being a form of insurance as well as their adherence to the Buddhist principles of compassion and avoidance of taking life as reasons behind the reticence to sell livestock (Levine 1999; Manderscheid 2001). The explosion of the caterpillar fungus economy in the 2000s provided many herders with an attractive cash income and allowed them to refrain from selling their livestock. This was also supported by the anti-slaughter campaign which originated at Larung Gar monastery. Concerned by the growing integration of Tibetan pastoralists into the Chinese market and state structures, Larung Gar's leaders pointed to the huge toll on animal lives that this process causes and urged herders to abstain from selling livestock for slaughter (Gaerrang 2015).

Fast forward to 2018 and livestock sales are one of the most important sources of cash income for pastoral households in areas such as Sogpo.[5] Cash has come to occupy a central place in pastoralists' economic life: they need to cover their children's school expenses, pay for medical care, equip their households with technical goods and fuel their vehicles. In this shift towards the market economy, where "everything costs money" (Sodnamkyid and Sułek 2017), the development of transport infrastructure plays a key role. Roads link often distant locations on the supply chain: pastures where yaks and sheep are raised and slaughterhouses where they are turned into meat for restaurants and butchers' countertops. Access to pasturelands through the expansion of a better quality road network has smoothed the way for big trucks to deliver livestock to Chinese markets.

[5] Other sources of income include: the caterpillar fungus economy, the sale of dairy products and medicinal plants, government subsidies and wage labour.

Yet, while herders in Sogpo do engage in the sale of livestock, they feel a deep ambivalence about it. On the one hand, livestock animals are considered to be repositories of fortune (*yang*) and so selling them comes with the risk of losing it, thus endangering the prosperity of the household.[6] On the other, pastoralists know very well what fate awaits the animals at the end of their journey, and slaughter brings bad karma to all those responsible, including herders. While the physical spaces of slaughter remain alien to the pastoralists' daily experience, livestock-loaded trucks are ubiquitous on the roads during sale season. Herders in Sogpo respond to the sight of a livestock-loaded truck in a similar way to how they would confront a dead, dying or suffering sentient being – be it human or nonhuman: by uttering the mantra *Om mani padme hum* and expressing ethical discomfort through bodily gestures. When slaughtering yaks or sheep at home, for the family's own consumption, pastoralists recite mantras, offer butter lamps and perform ritual gestures such as touching the animal's forehead with religious objects, pouring blessed water or placing sacred pills into its mouth. Selling livestock, too, comes with its share of prayers and ritual offerings: as Deba blows the yaks a last prayer before they leave Jamkhur and head to the slaughterhouse, butter lamps are still flickering on Tsewang's home altar.

[6] Before selling an animal, herders take some of its hair or wool and keep it at home as a way of preventing fortune from leaving the household.

A truck leaves for the county town slaughterhouse. Photo: Maria Coma-Santasusana, 2018.

Herders in Sogpo are no exception to the desire for roads and mobility described elsewhere (Dalakoglou 2010; Li 2014). However, as much as the renovation of Jamkhur's dirt road is welcomed by those eager to make their commute to township seats and county towns safer and faster, its smooth surface also opens to new perils and disruptions associated with engagement in the market. In processes of capitalist expansion, roads are often linked with danger and violence (Tsing 2005; Li 2018). The landscapes around logging roads, for example, are described by Anna Tsing as loci of "danger, urgency, and destruction" (2005: 67). In Tibetan pastoral regions, roads funnel livestock to distant slaughterhouses, thus facilitating a violence that happens many kilometers away. Witnessing the trucks transporting yaks and sheep prompts an emotional, embodied reaction in herders such as Deba. Like the stories Albanians tell about the Albanian–Greek cross-border highway, herders' responses to the sight of these trucks can be read as "vernacular expressions of anxiety and efforts to come to terms with the relatively new ethics of the market economy" (Dalakoglou 2010: 139). Their small, almost imperceptible gestures and utterances in the face of livestock-loaded trucks are indicative of their experience of roads as ambivalent, fraught spaces where the dilemmas of marketization are made tangible.

References:

Dalakoglou, Dimitris. 2010. "The Road: An ethnography of the Albanian–Greek cross-border motorway." *American Ethnologist* 37 (1): 132–49.

Diemberger, Hildegard. 2007. "Festivals and their leaders: The management of tradition in the Mongolian/Tibetan Borderlands." In *The Mongolia-Tibet Interface: Opening New Research Terrains in Inner Asia*, edited by Uradyn Bulag and Hildegard Diemberger, 109–34. Leiden: Brill.

Ferguson, James. 1994. *The Anti-Politics Machine: "Development," Depoliticization, and Bureaucratic Power in Lesotho*. Minneapolis, MN: University of Minnesota Press.

Gaerrang (Kabzung). 2015. "Development as as entangled knot: The case of the slaughter renunciation movement in Tibet, China." *The Journal of Asian Studies* 74 (4): 927–51.

Hutchinson, Sharon. 1996. *Nuer Dilemmas: Coping with Money, War, and the State.* Berkeley, CA: University of California Press.

Iselin, Lilian. 2014. "Translocal Practices on the Tibetan Plateau: Motorised Mobility of Pastoralists and Spatial Transformations." *Nomadic Peoples* 18: 15–37.

Levine, Nancy. 1999. "Cattle and the cash economy: responses to change among Tibetan nomadic pastoralists in Sichuan, China." *Human Organization* 58 (2): 161–72.

Li, Tania Murray. 2018. "After the land grab: Infrastructural violence and the "Mafia System" in Indonesia's oil palm plantation zones." *Geoforum* 96: 328–37.

Li, Tania Murray. 2014. *Land's End: Capitalist Relations on an Indigenous Frontier*. Durham, NC: Duke University Press.

Manderscheid, Angela. 2001. "Decline and re-emergence of nomadism: Tibetan pastoralists revive a nomadic way of life and production." *GeoJournal* 5 (2): 173–82.

Manderscheid, Angela et al. 2004. "From subsistence to market economy: Responses of Tibetan pastoralists to new economic realities." *Rangifer* 24 (4): 29–37. https://doi.org/10.7557/2.24.4.1721

Roche, Gerald. 2016. "The Tibetanization of Henan's Mongols: ethnicity and assimilation on the Sino-Tibetan frontier." *Asian Ethnicity* 17 (1): 128–49.

Sodnamkyid and Emilia Róża Sułek. 2017. "'Everything Costs Money': Livelihood and Economics in the 'New Resettled Village' of Sogrima, Golok (Qinghai Province)." *Nomadic Peoples* 21 (1): 136–51.

Tsing, Anna Lowenhaupt. 2011. *Friction: An Ethnography of Global Connection*. Princeton and Oxford: Princeton University Press.

Acknowledgements:

The author thanks reviewers Lilian Iselin, Colin Hoag and Emily Yeh, as well as editors Emilia Sułek and Thomas White, for their invaluable comments on this paper.

Cite as:

Coma-Santasusana, Maria. 2022. "On the Road to the Slaughterhouse." *Roadsides* 8: 23-29. https://doi.org/10.26034/roadsides-202200804

Maria Coma-Santasusana is a PhD Candidate at the Institut Français de Recherche sur l'Asie de Est at INALCO, France. She has a background in Social Anthropology and Tibetan Studies, and her research interests include more-than-human relationships, multispecies ethnography, and environmental change. The findings in this article are based on field studies carried out between 2016 and 2018 in a pastoral district of Qinghai province, in north-eastern Tibet. In 2016, Maria was a Visiting Scholar at the College for Tibetan Studies at the Minzu University in China, and in 2022, a Research Fellow at the Social Anthropology Unit at the University of Fribourg, Switzerland.

ISSN 2624-9081 • DOI 10.26034/roadsides-202200805

“The Road is the Biggest Killer”: Animal–Vehicle Collisions in Switzerland

Gabriel Roos

Roads are infrastructure used by humans, but they are also the place where automobilities and animobilities meet and result in animal–vehicle collisions (Michael 2004). When and why do these collisions happen and can they be prevented? What happens to the animals after their death? In this article, I focus first on the preventive infrastructure that should help avoid or reduce animal–vehicle collisions but that often fails to fulfil this goal. In the second part, I discuss the question faced by gamekeepers (German: *Wildhüter*) of how to dispose of animals killed on the road. The research for this article was conducted in spring 2022 with cantonal gamekeepers from the Swiss cantons of Bern and Obwalden. Part of these gamekeepers’ job on a daily basis is to deal with animals killed on the road.

Animal–vehicle collisions happen frequently. Studies (Canal et al. 2018; Steiner et al. 2021) have found that the main peak in such accidents is observed in the twilight hours. According to Koelle (2012: 652), this occurs because "humans have the same diurnal transportation schedule as many other species. Most animals travel at dawn and at dusk … which corresponds with our commuting rush hour." Moreover, the human influence on vehicle–animal accidents is not reserved to the fact that humans build roads through animals' habitats and have a similar diurnal mobility rhythm to many other creatures. As Peter,[1] a gamekeeper from the canton of Obwalden put it: "Tourism is a big killer of wildlife." For him this category also includes outdoor and leisure activities: "I'm glad whenever it's not a mushroom year," he remarked. Increased human activities in the forests cause disturbance among wild animals and increase the risk that they might run onto a road and into the path of an oncoming car.

[1] All names are pseudonyms.

Scholars explain animal–vehicle collision frequency based on animal behaviour (Hothorn et al. 2015; Steiner et al. 2021). However, as Walter, a gamekeeper in the canton of Bern commented: "There is no accident [involving animals] in which a human is without guilt." To put this into context: in 2020, state statistics in Switzerland counted 17,610 wild animals killed by road traffic (BfS 2021).[2] It is likely that the real number is actually much higher since not all injured animals are found, as they may move away from the road and die in the forest. Peter from Obwalden estimates that thirty to fifty percent of animals remain unfound. Moreover, the statistics include only medium-sized to large mammals such as deer or foxes, and do not account for reptiles, amphibians and birds.

[2] Since 1999 the numbers have fluctuated between 17,000 and 21,000. In 2019, 20,969 animals were killed. A decline in traffic due to the Covid-19 pandemic is a probable explanation for the smaller number in 2020.

Preventive Infrastructure

There are several ways of avoiding or reducing animal–vehicle collisions. The first category of preventive infrastructures directs the movement of animals to keep them away from roads. It includes fences combined with wildlife passages: overpasses and tunnels. The second category consists of infrastructures that warn or scare animals away via sensory methods: acoustic systems and light deflectors. The third category is directed at humans and informs them of animals crossing. These are road signs and stationary wildlife warning systems (Suter et al. 2021). The most effective solutions – wildlife passages, stationary wildlife warning systems – are also the most expensive. This generates a problem, in that "[w]here cost, rather than effectiveness, drives decision-making, mitigation effectiveness may be compromised" (Rytwinski et al. 2016: 2).

As a result, low-cost light deflectors and acoustic systems are the most popular preventive infrastructure. However, their efficacy remains unproven as little is known about how animals respond to such sensory stimulation (Baagøe et al. 2004; D'Angelo et al. 2006). Baagøe et al. (2004) argue, according to observed deer behaviour, that the animals habituate themselves to such warning systems, which therefore lose their efficacy with time. In a similar manner, humans grow overly accustomed to road signs: "Permanent signage from road authorities, warning of possibly crossing game animals is frequently deployed in abundance due to legal reasons and is consequently mostly ignored by drivers" (Steiner et al. 2021: 12). It turns out that humans as well as other animals are creatures of habit. This makes the work of preventing animal–vehicle collisions a challenge; despite efforts at accident prevention, roads remain deadly places.

Carcass Handling by Gamekeepers

In Switzerland, handling of carcasses is usually done in one of the three following ways. First, the meat can be consumed by humans. Second, carcasses can be disposed of in the wild, for natural composting or as food for other animals. The third option consists of delivering the carcasses to designated collection points (G. *Kadaversammelstellen*) and thereafter incinerating them.

Whether a carcass is composted, incinerated or consumed as human food depends on its legal status. Swiss federal law differentiates between two categories: *Unfallwild* and *Fallwild*. Of these two, only *Unfallwild* – i.e. "game that has been involved in an accident but is still found alive" (BLV 2017: 4) – can be consumed by humans, as long as it does not exhibit signs of disease. Animals categorized as *Fallwild* are disposed of either by composting or by incineration. Swiss federal law defines *Fallwild* as 'dead animals' (G. *verendete Tiere*) (BLV 2017: 4), but the cantonal law of Bern offers a more detailed definition which covers "all dead, sick and injured wild animals or parts thereof, as well as abandoned or orphaned young animals" (KB 2017: Art.23 Abs. 1), while hunting law in Obwalden does not offer any definition. Under federal law, "whole carcasses or parts of wild animals… in which there is no suspicion of the presence of a disease transmissible to humans or animals, or which are not collected after killing in accordance with good hunting practice" are excluded (VTNP 2018: Art. 2 Para. B). This leaves the door open to other forms of utilization and indicates a distinction between two subcategories of *Fallwild*: 'healthy' (G. *gesund*) and 'ill' (G. *ungesund*).

Roadkill – most likely this will serve as food for bearded vultures.
Photo: Gabriel Roos, 2022.

Peter, the gamekeeper from Obwalden, admits that he usually disposes of healthy *Fallwild* as carrion and for natural composting. Only carcasses showing signs of disease should, according to him, be delivered to carcass collection points. Disposing of all *Fallwild* would be a waste of valuable protein. In fact, some animals killed by traffic are of top quality: "As we say among ourselves [gamekeepers], this meat is often much better than shot meat." A whole field of negotiation opens up here, as sometimes minutes decide whether an animal injured on the road is found dead or alive. "Ask yourself, is it better if the animal was dead immediately or if it lived for another 15 minutes?", Peter asks.

While the leaving of carcasses in the wild is practised in sparsely populated Obwalden, Walter, the gamekeeper from Bern, has less freedom:

> *In the densely populated midlands, all the forests are very busy. Dog walkers are everywhere, and people are outdoors. If you leave a wild animal out in the forest or hide it somewhere … then a hiker's dog smells it … and the phone rings. There aren't many places where we can leave carcasses.*

Human incursions into animal habitats thus represent a danger to living animals as well as being a hindrance to gamekeepers, who would prefer for carcasses to stay as part of the natural cycle of decay and regeneration. However, the gamekeepers are constrained by time, too. Although Peter attempts to dispose of 'healthy' carcasses in the wild, he often fails because of time pressure due to the sheer size of the terrain and a shortage of personnel – in Obwalden just three gamekeepers manage an area of nearly five hundred square kilometres (BAFU 2022; IO 2022). Hence, even good quality carcasses sometimes end up at collection points, while their quality would justify moving them into the human food market to prevent waste.

Conclusion

Once killed on the road, animals become subject to a human legislative system which proscribes what should happen to carcasses left after an accident. These regulations do not always make sense to the gamekeepers in charge of overseeing their implementation and, consequently, a multitude of informal practices has emerged as the regulations are interpreted according to local knowledge or common sense. Despite all the measures aimed at preventing animal–vehicle collisions, the numbers of animals killed on the roads in Switzerland are not demonstrating any decline. Ideally, humans should be motivated not by costs but by effectiveness when implementing preventive infrastructure. We should refocus our vision to see ourselves not as a superior but a coexisting species. The number of collisions, however, indicates that the current state of this coexistence is severely imbalanced.

References:

Baagøe, Hans, Marianne Ujvári and Aksel Madsen. 2004. "Effectiveness of acoustic road markings in reducing deer–vehicle collisions: a behavioural study." *Wildlife Biology* 10 (2): 155–9. https://doi.org/10.2981/wlb.2004.011

BAFU, Bundesamt für Umwelt. 2022. "Jagdstatistik". Wildhüter (vollamtlich) 2017–2021 Obwalden.

BLV, Bundesamt für Lebensmittelsicherheit und Veterinärwesen. 2017. "Erläuterungen zur Verordnung über das Schlachten und die Fleischkontrolle (VSFK; SR 817.190) und zur Änderung der Verordnung des EDI über die Hygiene beim Schlachten (VHyS; SR 817.190.1)." Bern.

BfS, Bundesamt für Statistik. 2021. "Fallwild nach Art und Todesursache." Bern. https://www.bfs.admin.ch/bfs/de/home/statistiken/kataloge-datenbanken/tabellen.assetdetail.19624910.html

Canal, David, Beatriz Martin, Manuela de Lucas and Miguel Ferrer. 2018. "Dogs are the main species involved in animal–vehicle collisions in southern Spain: Daily, seasonal and spatial analyses of collisions." *PLoS ONE* 13 (9): 1–14. https://doi.org/10.1371/journal.pone.0203693

D'Angelo, Gino, Joseph D'Angelo, George Gallagher, David Osborn, Karl Miller and Robert Warren. 2006. "Evaluation of Wildlife Warning Reflectors for Altering White-Tailed Deer Behavior Along Roadways." *Wildlife Society Bulletin* 34 (4): 1175–83.

Hothorn, Torsten, Jörg Müller, Leonhard Held, Lisa Möst and Atle Mysterud. 2015. "Temporal patterns of deer–vehicle collisions consistent with deer activity pattern and density increase but not general accident risk." *Accident Analysis and Prevention* 81: 143–52.

IO, Integration Obwalden. 2022. "Kanton Obwalden." Sarnen. https://integration.ow.ch/schweiz/kanton-obwalden/

KB, Kanton Bern. 2017. "Jagdverordnung (922.111)." Bern. https://www.belex.sites.be.ch/app/de/texts_of_law/922.111/versions/1129

Koelle, Alexandra. 2012. "Intimate Bureaucracies: Roadkill, Policy, and Fieldwork on the Shoulder." *Hypatia. Special Issue: Animal Others* 27 (3): 651–69.

Michael, Mike. 2004. "Roadkill: Between Humans, Nonhuman Animals, and Technologies." *Society and Animals* 12 (4): 277–98.

Rytwinski, Trina, Kylie Soanes, Jochen A.G. Jaeger, Lenore Fahrig, C. Scott Findlay, Jeff Houlahan, Rodney van der Ree and Edgar A. van der Grift. 2016. "How Effective Is Road Mitigation at Reducing Road-Kill? A Meta-Analysis." *PLoS ONE* 11 (11): 1–25. https://doi.org/10.1371/journal.pone.0166941

Steiner, Wolfgang, Eva Maria Schöll, Friedrich Leisch and Klaus Hackländer. 2021. "Temporal patterns of roe deer traffic accidents: Effects of season, daytime and lunar phase." *PLoS ONE* 16 (3): 1–18. https://doi.org/10.1371/journal.pone.0249082

Suter, Stefan M., Martina Reifler-Bächtiger, Tanja Koch, Annette Stephani, Benjamin Sigrist, Roland F. Graf, Patrick Laube, Nils Ratnaweera, Ivo Kaelin and Anna Wróbel. 2021. "Prävention von Wildtierunfällen auf Strassenverkehrsinfrastrukturen." Bern: Eidgenössisches Departement für Umwelt, Energie und Kommunikation UVEK, Bundesamt für Strassen. https://www.mobilityplatform.ch/fileadmin/mobilityplatform/normenpool/21791_1698_Inhalt.pdf

VTNP. 2018. "Verordnung über tierische Nebenprodukte VTNP (916.441.22)." Bern. https://fedlex.data.admin.ch/filestore/fedlex.data.admin.ch/eli/cc/2011/372/20180601/de/pdf-a/fedlex-data-admin-ch-eli-cc-2011-372-20180601-de-pdf-a.pdf

---

Cite as:

Roos, Gabriel. 2022. "'The Road is the Biggest Killer': Animal–Vehicle Collisions in Switzerland." *Roadsides* 8: 30-35. https://doi.org/10.26034/roadsides-202200805

Gabriel Roos is an undergraduate student of Social Anthropology and European Studies at the University of Fribourg, Switzerland. He is interested in the connection between humans, infrastructure and animals.

ISSN 2624-9081 • DOI 10.26034/roadsides-202200806

Reconciliation Infrastructures

Maan Barua

In September 2021, the Government of Assam announced what are to be India's longest "wildlife friendly" flyovers (Anon. 2013). Purpose-built to mitigate the adverse effects of traffic on animal movement, these elevated structures will cost a staggering US$353.5 million. The contracts for the flyovers, designed to aid animal mobility, went to two private national engineering companies (Chakravartty 2021).

The flyovers, to be sited at nine places where a major National Highway cuts across wildlife corridors surrounding Kaziranga National Park (Government of Assam 2019), are the outcome of longstanding friction between local communities on one hand, and the state's Forest Department and conservation NGOs on the other. In 2008, a proposal to widen the existing two-lane highway to a four-lane one was cancelled after the Forest Department and various NGOs raised concerns regarding the impact that such infrastructure would have on animal movement (Anon. 2008). Indian highway authorities decided to create a bypass instead, much to the chagrin of local communities. In 2013, a public interest litigation in India's Supreme Court once again brought the highway to the state's attention. It pointed out that increasing vehicle traffic was contributing to high rates of wildlife mortality along the designated corridors, while the government had failed to act. Responding to Court directives to intervene, the Assam Government proposed making the existing highway wildlife friendly, a solution that sections of the local community were amenable to, for they viewed the highway as a "life line," creating entrepreneurial opportunities for youth and bringing "the light of civilization to the entire area" (Anon. 2009: 1).

Wildlife corridor outside Kaziranga National Park. A proposed site for the sanctioned flyovers. Photo: Maan Barua, 2021.

Wildlife-friendly flyovers and underpasses, like those proposed for Kaziranga, are examples of what I call reconciliation infrastructures: structures of circulation and contact designed to accommodate, foster and modulate other-than-human life. An active field of "reconciliation ecology" (Rosenzweig 2003a) underpins their development. As a subfield of conservation biology, reconciliation ecology aims to redesign "anthropogenic habitats so that their use is compatible with use by a broad array of other species" (Rosenzweig 2003b: 194). Promoted as a means of practising conservation in the "midst of human enterprise" (Rosenzweig 2003b), reconciliation ecology emerged in the early 2000s as a vital way to resolve the longstanding tension between conservation and development. Reconciliation infrastructures have sprung up the world over (Holder 2018; White 2020), particularly in light of the pace at which road expansion is taking place across the planet (Laurance and Arrea 2017). Many conservation organizations are working actively to mainstream such designs, so that proposed transnational highways and railway lines enable animal mobility rather than thwart it (Ament et al. 2021). Such developments are beginning to herald a new paradigm of conservation centred on connectivity – a paradigm increasingly scripted in the idiom of infrastructure. Not only does it render development compatible with, rather than antithetical to, conservation, it also allows forms of capitalist expansion to continue unabated.

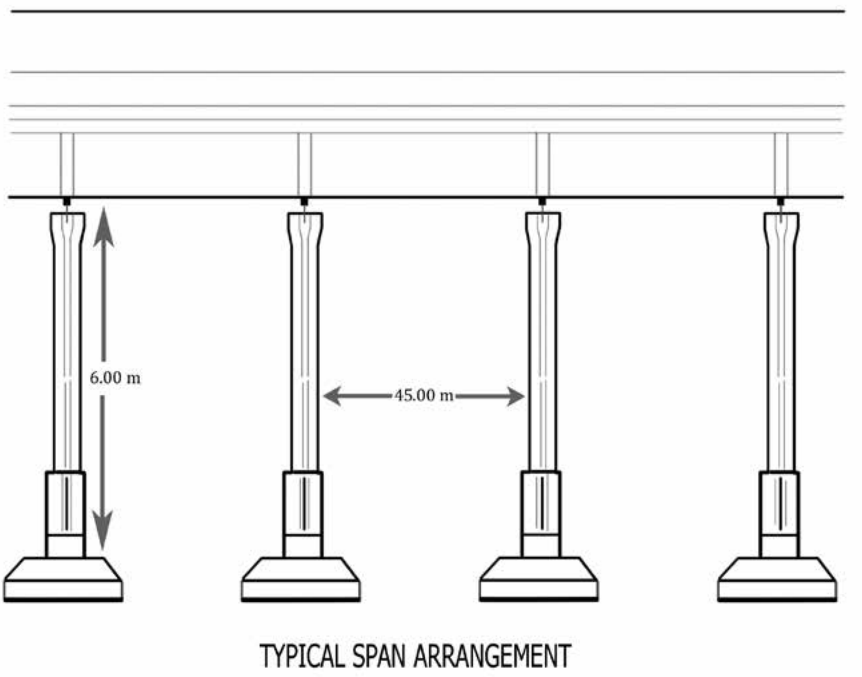
A crucial dimension of the design of such conduits is to generate affordances (Gibson 1986) that might be realized by other-than-humans. In other words, the architecture of flyovers and underpasses must work with how animals sense and move through a landscape, and it must strive to create situations where a creature might incorporate built elements into their own lifeworlds through habituation and use. Here, infrastructural design and assembly is not hylomorphic – the stamping of form upon inert matter – but ethico-aesthetic (Guattari 1995), where ethos implies habit and aesthesis the capacity to act and be affected (Metzger 2016: 583). Ecologists, architects and engineers coalesce

to design structures that mimic animals' ambient environments. These structures aim to manipulate affects in order to reduce "tunnel hesitation" and to foster crossings (Andrews et al. 2015: 188).

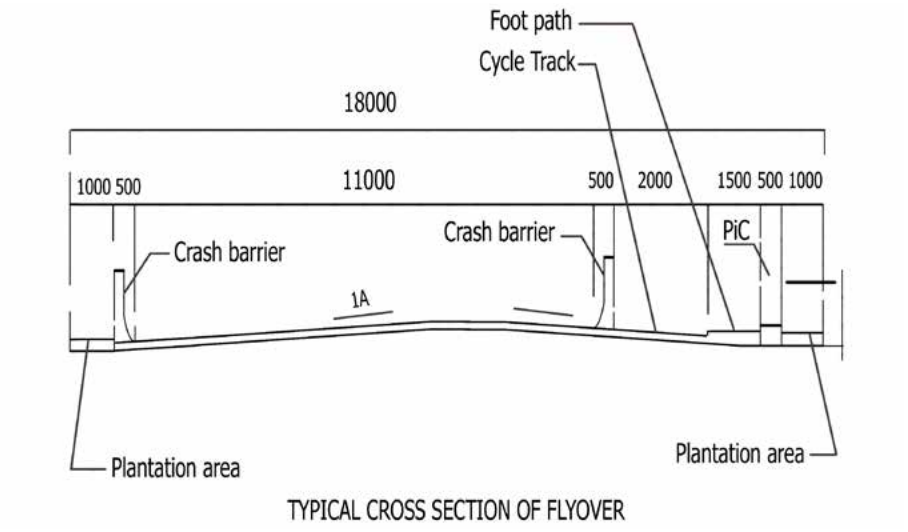
The proposed design of the flyovers and underpasses in Kaziranga reflects some of these developments. Each flyover will be six metres high and will have a huge 45m span between pillars, as elephant movement is what these structures aim to accommodate. The height and span, exceeding what is typical for flyovers in India, have been designed to accommodate what is not only one of the world's largest land-dwelling mammals but also one that has a herd sociality and which moves in groups. The structures will also have side walls so that the glare of headlights is reduced, and trees will be planted along the flyovers' edge in order to create a sound barrier. "Elephants rely heavily on auditory signals," remarked a wildlife biologist working in the area who I interviewed in 2021, indicating why such a design is necessary. The broad-span arrangement also aims to accommodate the mobility of deer, which suffer high rates of mortality in the area due to speeding traffic. "Animals like deer tend to avoid narrow passages," the biologist explained, "as there are dangers from predators."

Targeting the phenomenal world of animals, flyovers seek to inculcate particular movements and behaviours. Design, however, is not fool-proof. Reconciliation infrastructures often fail to channel animal movement along the particular pathways that ecologists, engineers and the state desire. As farmers in Kaziranga point out, the proposed flyovers are in spaces designated as wildlife corridors, but animal movement itself is far more unruly. "Are your elephants so polite that they will use no other path besides the corridor?" a farmer once asked a conservation NGO during a protest against wildlife conservation (Barua 2014: 567). Many farmers believe that the designation and consolidation of corridors, harking back to the 1980s, had spill-over effects: crop-raiding by elephants and other large herbivores in their fields increased as a result. The techno-managerial nature of such projects thus not only glosses over the recalcitrance of nature, but bypasses vernacular understandings of animal mobility as well.

The flyovers' design is also a point of contention among wildlife biologists. Some argue that tunnels for traffic might be a better option as they would reduce sound and provide a large land surface for animals to move across (Zaman 2021). Furthermore, the uneven effects of flyovers extend to the human realm: some are concerned that vehicular traffic will flow uninterrupted without stopping at roadside shops and *dhabas* from which people earn livelihoods. In other words, settlements would be bypassed, causing them to stagnate. Such apprehensions about stagnation run deep. During colonial times, infrastructural development in Assam primarily happened along tea plantations' transport corridors and did little for the uplift of the wider region (Guha 1977). The aggravation of a colonial pattern of poor economic development and scant industrial production in postcolonial Assam led to a reactionary backlash against the Indian state, resulting in years of secessionist militancy and political turmoil (Gohain 1996). Moreover, the social impacts of the new Kaziranga infrastructures will only be discernible later. While the flyovers will have a cycle track, enabling farmers and workers to commute, many women in the area, who do not know how to cycle and who are dependent on local rickshaws to commute, are likely to suffer. It is thus likely that unequal mobilities will emerge along gendered fault lines.



Proposed design of flyovers for wildlife corridors in Kaziranga. The span arrangement accommodates large herbivores such as elephants and rhinos. Redrawn from designs presented during public consultations, September 2021.



Cross-section of a flyover with a cycle path and "plantation area" to reduce the incursion of sound and light. Redrawn from designs presented during public consultations, September 2021.

Bridges, flyovers and underpasses, however, are more than simply designs for restoring and promoting animal mobility. They are a biopolitical strategy that induces a shift from the model of conservation operating through "confinements" or the preservation of wildlife populations in enclosed areas, to one modulating mobilities and targeting flows (Deleuze 1995: 178), operating on both wildlife and people. Reconciliation infrastructures herald what Foucault termed "environmentality": the operation of power through "*a canalization*" of circulations, the "coding" of reciprocal relations and the distribution of bodies in space (Foucault 2000: 361). In many postcolonial landscapes, connectivity conservation is becoming a mode of territorial expansion and control. Following a High

Court verdict, there have been evictions from land designated as corridors in Kaziranga (Saikia 2016). Inviolate corridors and passages for wildlife, aided by reconciliation infrastructures, also create uneven hierarchies of mobility across species divides: people are fixed in place while wildlife is free to roam (Bluwstein 2018).

Reconciliation infrastructures draw attention to a wider ontology of infrastructure, where infrastructures are not only apparatuses subtending human life but furnish the grounds for the reproduction of other-than-human life as well (Barua 2021). Posited as a win-win strategy (cf. Rosenzweig 2003a), reconciliation infrastructures embody normative aspirations to a form of ecological peace, a settled, frictionless order. Yet, as techno-managerial devices, they often fail to address historical conditions of dispossession and violence (Mookherjee 2022). Furthermore, carboniferous capitalism goes unaddressed. Flyovers encourage the opening up of frontiers, enabling the relentless expansion of capital to continue "without disruption" (White 2020).

As phenomena that are increasingly being mainstreamed, reconciliation infrastructures deserve greater critical and ethnographic enquiry. Once deemed antithetical to conservation, particularly to Edenic visions of nature, infrastructures are now beginning to script conservation practice (Sutter 2005). These are the new sites where the old frictions between conservation and postcolonial development are beginning to play out. While poised to foster conditions for the flourishing of other-than-human life, reconciliation infrastructures also risk becoming an engineering fix: a techno-managerial intervention for a problem created by infrastructures, colonial violence and dispossession in the first place.

References:

Ament, Rob, Sandeep Kumar Tiwari, Melissa Butynski, Becky Shu Chen, Norris Dodd, Aditya Gangadharan, Nilanga Jayasinghe, Aaron Laur, Gabriel Oppler, Wong Ee Phin, Rodney van Der Ree and Yun Wang. 2021. *Protecting Asian Elephants from Linear Transport Infrastructure: The Asian Elephant Transport Working Group's Introduction to the Challenges and Solutions*. Gland, Switzerland: IUCN WCPA Connectivity Conservation Specialist Group/IUCN SSC Asian Elephant Specialist Group.

Andrews, Kimberley M., Priya Nanjappa and Seth P.D. Riley (eds.). 2015. *Roads and Ecological Infrastructure: Concepts and Applications for Small Mammals*. Baltimore, MD: Johns Hopkins University Press.

Anon. 2013. "State Govt proposes wildlife-friendly steps." *Assam Tribune*, 17 November.

Anon. 2009. *Save Kaziranga National Park: Construct NH-37 in its Original Alignment From Koliabor to Numoligarh*. Kaziranga: Conversion of NH-37 to 4 Lane Road Demand Committee (Koliabor to Numoligarh).

Anon. 2008. "Reprieve for Kaziranga: Expansion of NH-37 Halted." *Assam Tribune*, 18 August.

Barua, Maan. 2021. "Infrastructure and non-human life: a wider ontology." *Progress in Human Geography* 45 (6): 1467–89. https://doi.org/10.1177/0309132521991220

Barua, Maan. 2014. "Circulating elephants: unpacking the geographies of a cosmopolitan animal." *Transactions of the Institute of British Geographers* 39 (4): 559–73.

Bluwstein, Jevgeniy. 2018. "From colonial fortress to neoliberal landscapes in Northern Tanzania: a biopolitical ecology of wildlife conservation." *Journal of Political Ecology* 25: 144–68. https://doi.org/10.2458/v25i1.22865

Chakravartty, Anupam. 2021. "Controversial Kaziranga elevated road project goes for public scrutiny." *East Mojo*, 4 September. https://www.eastmojo.com/assam/2021/09/04/controversial-kaziranga-elevated-road-project-goes-for-public-scrutiny/

Deleuze, Gilles. 1995. *Negotiations*. New York: Columbia University Press.

Foucault, Michel. 2000. *Power: Essential Works of Michel Foucault, 1954–1984*. New York: The New Press.

Gibson, James J. 1986. *The Ecological Approach to Visual Perception*. New York: Taylor & Francis.

Gohain, Hiren. 1996. "Extremist Challenge and Indian State: Case of Assam." *Economic and Political Weekly* 31 (31): 2066–8.

Government of Assam. 2019. *Report on Delineation of Nine Animal Corridors Connecting Kaziranga National Park to Karbi-Anglong*. Committee for Delineation of Corridors, Forest Department, Government of Assam.

Guattari, Felix. 1995. *Chaosmosis: An Ethico-aesthetic Paradigm*. Bloomington, IN: Indiana University Press.

Guha, Amalendu. 1977. *Planter Raj to Swaraj: Freedom Struggle and Electoral Politics in Assam 1826–1827*. New Delhi: People's Publishing House.

Holder, Sarah. 2018. Animals need infrastructure too. *Bloomberg CityLab*, 31 July. https://www.citylab.com/life/2018/07/wildlife-crossings-bridges-tunnels-animals-roads-highways-roadkill/566210/

Laurance, William F. and Irene Burgués Arrea. 2017. "Roads to riches or ruin?" *Science* 358 (6362): 442–4. https://doi.org/10.1126/science.aao0312

Metzger, Jonathan. 2016. "Cultivating torment: The cosmopolitics of more-than-human urban planning." *City* 20 (4): 581–601.

Mookherjee, Nayanika. 2022. "Introduction: On irreconciliation." *Journal of the Royal Anthropological Institute* 28 (S1): 11–33. https://doi.org/10.1111/1467-9655.13751

Rosenzweig, Michael L. 2003a. *Win-win Ecology: How the Earth's Species can Survive in the Midst of Human Enterprise*. Oxford: Oxford University Press.

Rosenzweig, Michael L. 2003b. "Reconciliation ecology and the future of species diversity." *Oryx* 37 (2): 194–205. https://doi.org/10.1017/S0030605303000371

Saikia, Ritupallab. 2016. "Kaziranga eviction turns violent." *The Telegraph*, 20 September.

Sutter, Paul S. 2005. *Driven Wild: How the Fight against Automobiles Launched the Modern Wilderness Movement*. Washington DC: University of Washington Press.

White, Thomas. 2020. "Road Ecology." *Society and Space*, https://www.societyandspace.org/articles/road-ecology

Zaman, Rokibuz. 2021. "Villagers against KNP flyover project." *The Times of India*, 6 September.

Funding:

Research for this article was enabled by a European Research Council Horizon 2020 Starting Grant *Urban ecologies: governing nonhuman life in global cities* (uEcologies; Grant No. 759239).

Cite as:

Barua, Maan. 2022. "Reconciliation Infrastructures." *Roadsides* 8: 36-42. https://doi.org/10.26034/roadsides-202200806

Maan Barua is a University Lecturer in Human Geography at the University of Cambridge. His research focuses on the ontologies, economies and politics of the living and material world. Maan's current work is on urban life and he leads a European Research Council Horizon 2020 Starting Grant on *Urban ecologies*.

ISSN 2624-9081 • DOI 10.26034/roadsides-202200807

Caribou Count:

Images, Infrastructure and Contested Indicators

Simone Schleper

I call Shawn Haskell over Skype and record our conversation on my phone. Summer 2020, the Netherlands are in lockdown. During the 1990s Haskell worked on caribou crossing behaviour in the vicinity of one of the largest pipelines in the world: the Trans-Alaskan Pipeline System, TAPS for short. “If you want a real understanding of how those animals interact with the oil field just go watch,” says Haskell, who now works for a non-profit land conservation organization in New England. He sends me a number of photographs of caribou cows grazing close to the industrial structure with their calves. “There’s really been no measurable impact to anything,” he points out, referring to the pictures that show a healthy heard unimpressed by the large obstacle on their migratory route (Haskell 2020).

In recent years, conservation biologists and social science and humanities scholars working on the environment have called for new, interdisciplinary approaches to nature protection that stress the sociocultural aspect of conservation work and the material interconnectedness of environmental technologies, infrastructures and nonhuman life (Mascia et al. 2003; Barua 2021). Within the environmental humanities, especially, scholars have long pointed to the need to reconsider preservationist approaches to conservation that forbid any kind of human activity in protected areas (Cronon 1995; Marris 2011). Yet while images such as Haskell’s put individual caribou and their ability to adapt to human-made infrastructures centre stage, they have become contested indicators of successful impact mitigation that are easily shared and hard to argue against.

After the discovery of oil at Prudhoe Bay in the late 1960s, commercial plans for the pipeline caused much debate between proponents and opponents of Arctic oilfield development. This led to the introduction of impact assessment reports, first in the United States and then elsewhere, as discussed by the environmental historian Peter Coates (1991). In the early stages of the debate, a significant focus was placed on the migratory caribou in the area of the larger TAPS structure. These huge herds of annually migrating caribou, which travel up to 650 kilometres between their summer and winter ranges, are a dominant species in the Alaskan ecosystem. The caribou are also closely linked to local Indigenous traditions of living with the land and its animals – lifeways that were increasingly challenged by the market-based approach of the Alaska Native Claims Settlement Act of 1971 that transferred federally controlled land to native-owned economic development corporations (Anderson 2007). Since the completion

Caribou under the Trans-Alaska Pipeline.
Photo: Tim Craig, Bureau of Land Management Alaska, 2004, CC 2.0.

of the pipeline in 1977, then, caribou have become key indicators of the health of the ecosystem. They remain caught up in professional disagreements between two camps of wildlife biologists on how to measure the ecological impact of the big extractivist infrastructure (Schleper 2022).

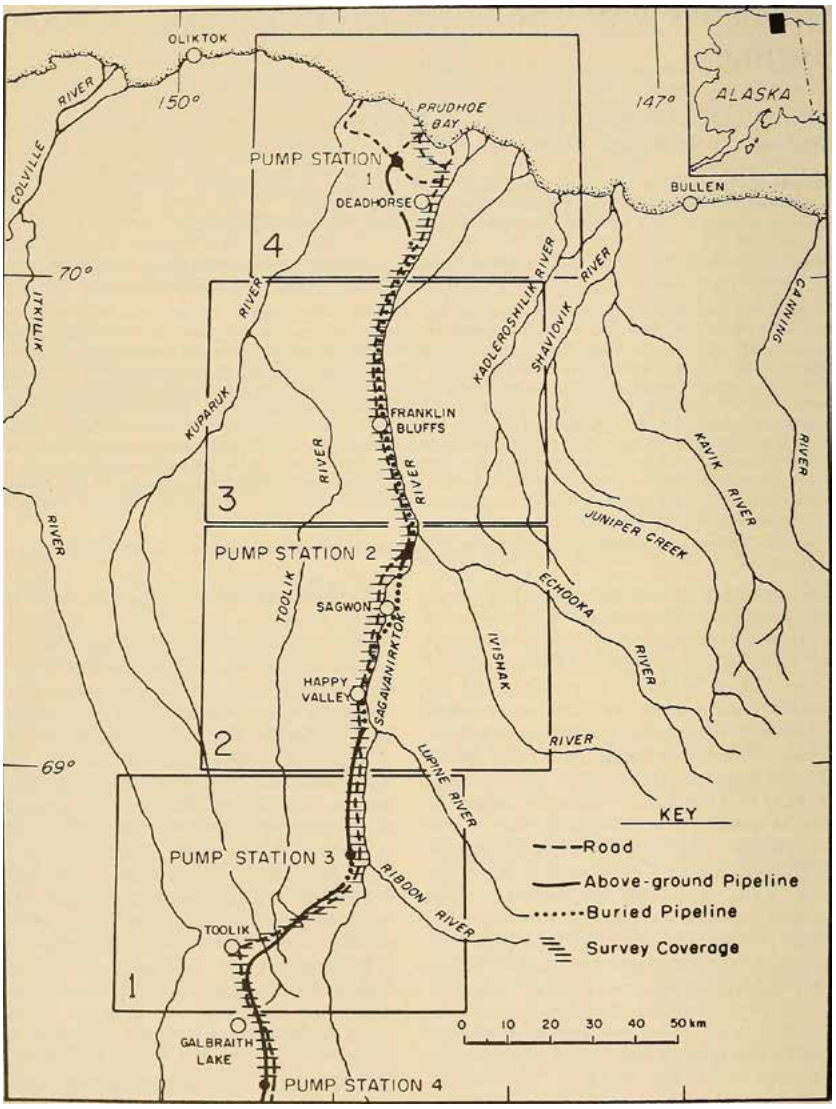
The archives of the Royal Geographical Society contain a draft statement from the World Wildlife Fund, the International Union for Conservation of Nature and Natural Resources, and the International Biological Program (Nicholson 1971). This statement, drafted by leading figures from these three organizations, did not condemn the pipeline. Instead, in the utilitarian spirit of post-Second World War conservation, the TAPS was presented as an opportunity to prove the possibility of combining ecologically grounded conservation and industrial infrastructural development. According to the statement, the companies involved in construction had sufficiently fulfilled the environmental mitigation requirements by mounting and burying sections of the pipeline, allowing large mammals – such as caribou, moose or elk – to pass above or underneath.

TAPS and Dalton Highway. Photo: Bureau of Land Management Alaska, 2021. Public Domain.

In fact, from the 1970s onwards, the TAPS became a key site for behavioural researchers and wildlife professionals interested in understanding the compatibility of conservation and development. In 1971, researchers at the University of Alaska, Fairbanks, conducted some initial experiments with simulated pipelines, using snow fences and oil barrels, to understand how migratory mammals, especially caribou, would be affected by the pipeline (Child 1973). After the construction of a haul road to Prudhoe Bay in 1974, regular observations began. In particular, researchers at the university, the Alaska Department for

Fish and Game (ADFG), and consultancy firms including LGL Alaska Research Associates, started to look for signs of habituation or rejection of the infrastructure.

Since the 1960s, the concept of habituation – the ability of animals to get used to changes in their environment – has been important in behavioural research. Habituation behaviour was first highlighted by field researchers, such as Jane Goodall or George Schaller, in African national parks to justify their presence as observers of animal behaviour in locations otherwise deemed undisturbed (Montgomery 2015). In the 1970s, the idea of habituation was applied to large mammals in national parks and more managed environments (Whittaker and Knight 1998). In our case, despite negative predictions about the reaction of caribou to the pipeline, observed crossings and aerial counts suggested that between 1972 and 1983 the population of the Central Arctic Herd – the caribou herd that spends most time in the Prudhoe Bay area – had not declined but actually increased by thirteen percent (Bergerud, Jakimchuk and Carruthers 1984).



Map of the TAPS in* The Canadian Field-Naturalist *1979: 156.

Research on the effects of the pipeline continued into the 1990s. In 1991, the North Slope Borough, the ADFG, the US Fish and Wildlife Service, and the Alaska Oil and Gas Association, which included oil companies involved in the TAPS project, such as Alyeska, BP, Exxon and Conoco, established a steering committee on caribou. They hired LGL to report on the effectiveness of the different types of infrastructure used to mitigate the environmental impact of the TAPS, such as overpasses and underpasses. Counting and capturing on camera caribou crossing the pipeline, LGL researchers even suggested that during the summer months, some of these animals actively sought out the infrastructure (Truett et al. 1994). Gravelled areas and shady places under elevated sections of the pipeline seemed to offer some relief from flies and mosquitoes. Published in 2002, the renewed environmental impact statement for the TAPS drew heavily on this research by LGL, emphasizing the learning abilities of caribou, and presenting overpasses and underpasses as successful mitigation measures (Argonne National Laboratory 2002).

Photographs showing big-eyed calves and their surprisingly gregarious mothers next to pipes and pumps are indeed compelling. As the caribou do not seem to mind the structure, these images provide powerful indicators of the wellbeing of the future of the herd. Yet the focus on direct observation and overall population numbers of caribou as general indicators for the environmental impact of drilling has made it easy for industrialists to argue for more oil development in the Arctic. Up to today, oil companies and Republican politicians are trying to expand Arctic drilling in Alaska to areas considered crucial for wildlife, for instance in the Arctic National Wildlife Reserve, east of Prudhoe Bay (White 2021).

In fact, the focus on caribou counts has made research into the broader, diverse ecological effects of the TAPS more difficult. In an email conversation of June 2020, Don Russell, an ecologist who investigated the impact of the pipeline infrastructure on trophic cycles between different organisms within the Arctic ecosystem recounted the difficulties of arguing against images such as those by Haskell: "I remember one of the industry biologist consultants saying: 'So what if feeding declines by five percent, show me the bodies.' In other words, [we had to demonstrate] that these documented effects have an impact at the population level."

Therefore, this is not only a political discussion, or not simply one about whether oil drilling should be allowed in perhaps more pristine Arctic environments. When looking through the large body of reports on the compatibility of the pipeline and caribou health on the one hand, and those pointing to the multiple effects of extraction infrastructure, roads and potentially spills on Alaskan ecosystems on the other, we can see that authors from both camps are diverse in their political inclinations. They have worked variously for consultancies, government and state institutions, and the university, while the industry has been funding most of the biological research in the area. Instead, this is a discussion about scientific indicators and the proper ways to measure impact. Overall, the emphasis on caribou behaviour, observed crossings and population counts has made it more difficult to examine and argue for the cumulative impact of the pipeline. The neglecting of these cumulative impacts – including the various ecological, sociological and cultural effects of the pipeline, adjacent roads, development work, increased noise levels and a stronger human presence in the area – on biodiversity loss, permafrost degradation, air and water quality, and the disturbance

of traditional resource-use practices by the Iñupiat, is increasingly recognized (Nuttall 2010; Sakakibara and Ahtuangaruak 2021).

The case of the TAPS and the presence of Alaskan caribou as sole indicators of its impacts has wider significance. Recent social science literature on conservation in modified environments has called for a sharper focus on animal behaviour and an understanding of animals as active agents in the conservation process, able to learn and adapt to changes in their environment (Lorimer 2015). Yet critical voices have called for closer attention to the different ways in which scholars in the life sciences have attributed agency to their research subjects (Krause and Robinson 2017; Rees 2017; Cassidy 2019). The history of the TAPS, then, demonstrates that a focus on highly visible and adaptable animals may inhibit the understanding of the cumulative effects of industrial infrastructure development, including various interrelated ecological and social impacts on people and environments.

References:

Anderson, Robert T. 2007. "Alaska Native Rights, Statehood, and Unfinished Business." *Tulsa Law Review* 43 (17): 17–42.

Argonne National Laboratory. 2002. *Renewal of the Federal Grant for the Trans-Alaska Pipeline System Right-of Way Volume 3*. Lemont: U.S. Bureau of Land Management.

Barua, Maan. 2021. "Infrastructure and Non-Human Life: A Wider Ontology." *Progress in Human Geography* 45: 1–23. https://doi.org/10.1177/0309132521991220

Bergerud, Arthur, Ronald Jakimchuk Ronald and David Carruthers. 1984. "The Buffalo of the North: Caribou (Rangifer tarandus) and Human Developments." *Arctic* 37 (1): 7–22. https://doi.org/10.14430/arctic2158

Cassidy, Angela. 2019. *Vermin, Victims and Disease: British Debates over Bovine Tuberculosis and Badgers*. Cham: Palgrave Macmillan.

Child, Kenneth. 1973. *The Reactions of Barren-Ground Caribou (Rangifer tarandus granti) to Simulated Pipeline and Pipeline Crossing Structures at Prudhoe Bay: A Completion Report of the Alaska Cooperative Wildlife Research Unit*. Fairbanks, AL: University of Alaska.

Coates, Peter. 1991. *The Trans-Alaska Pipeline Controversy. Technology, Conservation and the Frontier*. Bethlehem, PA: Lehigh University Press.

Cronon, William. 1995. *Uncommon Ground: Toward Reinventing Nature*. New York: WW Norton & Company.

Krause, Monika and Katherine Robinson. 2017. "Charismatic Species and Beyond: How Cultural Schemas and Organisational Routines shape Conservation." *Conservation and Society* 15 (3): 313–21.

Lorimer, Jamie. 2015. *Wildlife in the Anthropocene: Conservation after Nature*. Minneapolis, MN: University of Minnesota Press.

Marris, Emma. 2011. *Rambunctious Garden: Saving Nature in a Post-Wild World*. New York: Bloomsbury.

Mascia, Michael, Peter Brosius, Tracy Dobson, Bruce Forbes, Leah Horowitz, Margaret McKean and Nancy Turner. 2003. "Conservation and the Social Sciences." *Conservation Biology* 17 (30): 649–50. https://doi.org/10.1046/j.1523-1739.2003.01738

Montgomery, Georgina. 2015. *Primates in the Real World: Escaping Primate Folklore and Creating Primate Science*. Charlottesville, VA and London: University of Virginia Press.

Nicholson, Max. 14 April 1971. "Draft Joint Statement on the Alaska Pipeline revised." Edward Max Nicholson Papers, Royal Geographical Society, Box 2, Folder "Alaska visit."

Nuttall, Mark. 2010. *Pipeline Dreams: People, Environment, and the Arctic Energy Frontier*. Copenhagen: IWGIA.

Rees, Amanda. 2017. "Wildlife Agencies: Practice, Internationality and History in Twentieth-Century Animal Field Studies." *The British Journal for the History of Science Themes* 2: 127–49.

Sakakibara, Chie and Rosemary Ahtuangaruak. 2021. "'We Are Torn about our Future': Big Oil and Iñupiaq Community Health in Arctic Alaska." In *Cold Water Oil: Offshore Petroleum Cultures*, edited by Fiona Polack and Danine Farquharson, 21-39. London: Earthscan.

Schleper, Simone. 2022. "Caribou crossings: the Trans-Alaska Pipeline System, conservation, and stakeholdership in the Anthropocene." *The British Journal for the History of Science* 55: 127–43. https://doi.org/10.1017/S0007087422000048

Truett, Joe, Robert Senner, Kenneth Kertell, Robert Rodrigues and Robert Pollard. 1994. "Wildlife Responses to Small-Scale Disturbances in Arctic Tundra." *PERC* 22 (2): 317–24.

Whittaker, Doug and Richard L. Knight. 1998. "Understanding Wildlife Responses to Humans." *Wildlife Society Bulletin* 26 (2): 312–17.

Wight, Philip, 2021. "How the Alaska Pipeline is fueling the push to drill in the Arctic Refuge." *Yale Environment360*. https://e360.yale.edu/features/trans-alaska-pipeline-is-fueling-the-push-to-drill-arctic-refuge

Cite as:

Schleper, Simone. 2022. “Caribou Count: Images, Infrastructure and Contested Indicators.” *Roadsides* 8: 43-50. https://doi.org/10.26034/roadsides-202200807

Simone Schleper is Assistant Professor at the History Department of Maastricht University. Her recent work deals with the history of animal migration research and the management of migratory species. In particular, she looks at the ways in which animal movement and migration have been negotiated with the growing spatial, economic and industrial expansion by humans. The research discussed in this article was part of the project Moving Animals, funded by the Dutch Research Council (NWO). Two of her recent case studies concern spatial conflicts between migratory wildebeest and local human communities in the Serengeti National Park in Tanzania, and mitigation efforts to allow for the migration of North American caribou close to the resource-extraction infrastructures of the Trans-Alaska Pipeline System.

ISSN 2624-9081 • DOI 10.26034/roadsides-202200808

Swarming Infrastructures

Jack Greatrex

The first car on the roads of Malacca, a town in the British Straits Settlements colony on the Malay Peninsula, was reportedly nicknamed The Swallow. Images of the eponymous bird were painted onto the vehicle: an avian metaphor fitting for the new, emerging age of the automobile, with its associations with freedom, rapidity and the smoother flows of modern life (Hillier 1961: 99).[1]

The Swallow and its driver, however, were not the only ones taking advantage of the greater speed and smoothness promised by the spread of Malaya's transport infrastructure in the early twentieth century. So too, this article suggests, did Malaya's roads and railways facilitate the migratory swarming of locusts. The insects passed along these engineered pathways unobstructed by forest, basked on metal tracks, and bred among and ate the invasive grasses flourishing along the rail lines and roadsides. The Swallow was paralleled by the locust: a fellow, if unexpected, traveler on the infrastructures of British colonialism. These entanglements of roads, rail and locusts invite reflection on the more-than-human repurposing of infrastructure.

[1] Although The Swallow's fate itself fell short of this promise – ultimately it crashed and was put back on the market (Hillier 1961: 99).

According to colonial records, locusts had swarmed in Malaya for the first time in 1912, doing so again annually until 1919.[2] The swarms could be intimidating sights. They were "marching in an army" one colonial official wrote (Pratt 1913: 79). "Like a huge dark cloud," was how a newspaper reporter described them (Straits Times 1913a: 8). The locusts damaged crops – especially the padi farmed by Malays (Corbett and Miller 1936: i).

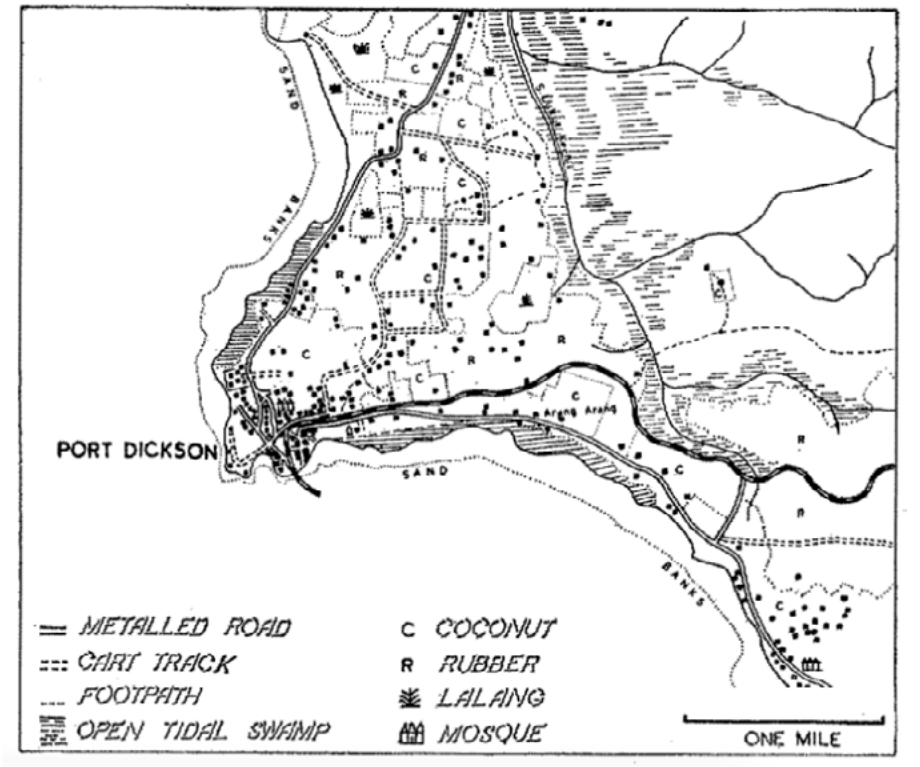
[2] Locust swarms were not recorded to nearly the same extent after 1919, for reasons not entirely clear and which are beyond the scope of this essay.

Locust swarming in Malaya in the 1910s traced the development of colonial transport infrastructure. Industries extracting such primary products as tin and rubber latex had developed in British Malaya since the late nineteenth century, leading to a network of railways and roads to service mines and plantations (Kaur 1980: 697). But just as this infrastructure had allowed investors and the colonial state to swell with profit, it had also created countervailing effects. Not only had it permitted tin and rubber to move, but locusts as well.

Malaya's locust–infrastructure nexus was reported repeatedly by colonial officials and residents. Locusts basked – an "irritating habit," one official wrote – on the metal railway tracks (Pratt 1913: 79). So too, they traveled – in 1912, a notice to officials in Selangor warned: "The hoppers often use the main roads to travel on" (ANMKLa: n.p.). In that year, the association between locusts and roads was so striking that it even led to ideas for controlling the insects: "Light rollers," one official suggested, "running about 8 miles an hour would probably crush millions if they were run up and down a road infested with locusts" (TNA 1912: 12). A "dense mass" of the insects was again found on roads the year after, with the swarm cannibalizing those locusts crushed by vehicles (Pratt 1913: 78–79). In 1916, frustrated officials reported how locusts had escaped destruction efforts by swarming along the railway line between Tampin and Gemas, while, in the same year, swarms were reported to have arrived in the state of Pahang for the first time by traveling along the Pahang Railway Line (ANMKLb: 1, 4–5). A map of the swarms produced by the Department of Agriculture in 1936 shows their distribution in green: spread across Negri Sembilan, they follow the railway lines to fork outwards, northwest to Ulu Selangor and northeast to Temerloh, Pahang (Corbett and Miller 1936: n.p.).

Of course, in some ways the road–locust nexus was an artifact of the limited scope of colonial vision. Roads and rail were spaces that made locusts visible to colonial eyes: such as for the resident who in January 1914 watched through the window of a train from Tampin to Malacca as "numbers of Malays fought to 'beat [locusts] off'" the padi fields to the sides of the railway (SFPMA 1914: 6). When the insects slipped away from roads and rail, or other sites of heightened visibility, they went beyond the vision and knowledge of the colonial authorities: as, for instance, the several swarms in Selangor which "at times disappeared in the jungle and were lost sight of for several days" (ANMKLb: 2).

Roads and rail, then, served as onto-epistemological apparatuses, making the locust knowable and visible (Barad 2014: 232). But not only helping set the limitations of colonial perception, infrastructures were also biogeographically significant for the living ones. As well as facilitating movement, roads and railways provided habitat for locusts, being among those sites in Malaya where previously dense forest had been substituted with profuse *lalang*.

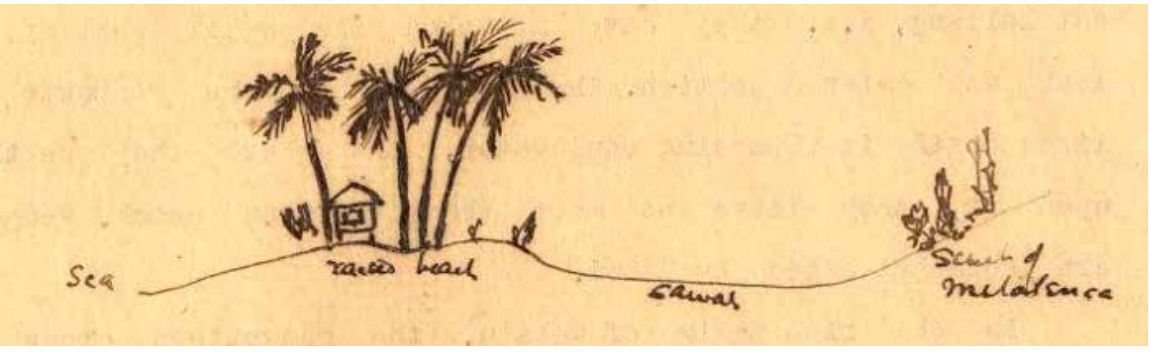


The town of Port Dickson in 1942.* Lalang *is one of the key symbols of the map and can be seen in the peri-urban north of the town.
Source: Dobby 1942: 230.

Lalang is the Malay name for a tall grass, Imperata cylindrica, which grows vigorously on recently cleared land in Southeast Asia; this species has a rhizomatic root-system, making it notoriously difficult to remove through weeding (CABI 2008). Although thought to be native to the region, the plant behaved as an "invasive" as the Malayan landscape was transformed fundamentally under colonial rule – as was the case with many new "vegetal geographies" linked to empire (Barua 2022b). Such landscape transformation obliterated many species and even whole ecosystems in Malaya, but *lalang* by contrast flourished amid the disruption. "Construction and decay," Joniak-Lüthi (2020: 9) has written, "are two sides of the same coin" – and, in disorderly boom conditions, *lalang* thrived on awkward sites in plantations, at urban fringes, and along roads and rail where rapid change met environmental neglect (Greatrex forthcoming). As it did so, it created emergent and recombinatory opportunities for other organisms (Kirksey 2015: 1; Barua 2022a: 14).

Locusts were one of the so-called pests to thrive amid *lalang*: they reproduced in its thickets, and they also consumed it. One of the most perceptive witnesses to landscape change in the Malaya of the 1910s was Isaac Henry Burkill, of the Singapore Botanic Gardens. On a tour of Malacca and Negri Sembilan, he noted how *lalang* had enabled locusts to thrive: "It is certain," he wrote of the insect, "that the past condition of the country – well forested – would be inimical to it," but now that "artificial wastes" had been created, patches of *lalang* had become "the strongholds of the locusts" (Burkill and Cowley-Brown 1916: 340). In his diary, Burkill described visits to Malayan villages and hillsides at a time of spreading rubber cultivation. *Lalang* was beginning to penetrate such areas, and he sketched squiggles of it and similar scrubby grasses as they encroached across the landscape.

Roadsides hosted *lalang* as well, Burkill noted: traveling between Tampin and Seremban, he describes how the road "soon gets into lallang [*sic*]" (Burkill 1925: 24). Others remarked on the links too. As the author of an irritated letter to a local newspaper wrote, journeying by train through Perak or Selangor revealed how the railway lines were "covered with a thick, matted, and rank growth of *lalang*" (Malaya Tribune 1915: 2). One motorist in 1913 noted the thirteen swarms of locusts he encountered while traveling between Rawang and Kuala Lumpur, and their preference for the *lalang* along the road (*Straits Times* 1913b: 2).



The encroachment of scrubby grasses towards a Malay kampong village. Hand-drawn sketch from Burkill's diary (1925: 22).

There was some irony to claims that road- and rail-side *lalang* wastes were facilitating locust swarming. Plantation production in Malaya had never been an exclusively British, or even European affair. Even before the British had arrived in Singapore in 1819, for instance, Chinese gambier-planters had already established plantations on the island (O'Dempsey 2014: 18–19) – a Chinese-dominated industry which expanded greatly across the nineteenth century before fading out with the advent of other cash crops, such as copra, coffee and, above all, rubber and later oil palm. Gambier-planting had also been associated throughout with the spread of *lalang* and "scrub" (O'Dempsey 2014: 22–28). Partly for this reason, colonial commentators had condemned Chinese gambier-planters using a racialized vocabulary of insectification (see Raffles 2007). "The Locust of Agriculture," was how Burkill denigrated gambier-planting (Burkill 1923: 39). Others damned Chinese planters themselves as being "locusts" (Kathirithamby-Wells 2005: 37). In elucidating the spread of *lalang* and locusts along transport infrastructures, however, colonial commentators were describing changes to the landscape under the British that were linked not with merely metaphorical locusts – but living ones.

This history of roads, railways, *lalang* and locusts provokes reflection on the more-than-human lives of infrastructures. Infrastructures shape mobility and structure everyday life – but so too, as Maan Barua (2021: 2–3) has suggested, must we consider how they do the same for more-than-human forms of life. Malayan locusts repurposed colonial infrastructures to their own ends. Designed as implements of extraction and transportation, roads and rail enabled swarming, becoming places for locusts to eat, breed and travel, just as macaques have transformed the highways of contemporary India into habitat (Barua 2021: 4). The colonial authorities prided themselves on engineering works which would "open up" Malaya to commerce, industry and modernity. "In no direction has the beneficent result of British influence in Malaya been more strikingly

manifest," wrote one leading official regarding the colony's railways, "than in the opening up of the territory … by the introduction of rapid means of communication" (Wright and Cartwright 1908: 303). Expedience and smoothness were the promises of colonial infrastructure – just as for The Swallow, with its name marrying technological progress and avian freedom. But these infrastructures had consequences beyond colonial intentions. Roads and rail were repurposed to serve not only as rapid means of communication – but so too, as rapid means of swarming.

References:

ANMKLa, Arkib Negara Malaysia Kuala Lumpur. 1957/0164584. "Circular Regarding of Locusts."

ANMKLb, Arkib Negara Malaysia Kuala Lumpur. 1957/060196. "Quarterly Report on Locust Work in the F. M. S. during 1916."

Barad, Karen. 2014. "Invertebrate Visions: Diffractions of the Brittlestar." In *The Multispecies Salon*, edited by Eben Kirksey, 221–41. Durham, NC: Duke University Press.

Barua, Maan. 2022a. "Feral Ecologies: The Making of Postcolonial Nature in London." *Journal of the Royal Anthropological Institute* 28 (3): 896–919.

Barua, Maan. 2022b. "Plantationocene: A Vegetal Geography." *Annals of the American Association of Geographers*. https://www.tandfonline.com/doi/full/10.1080/24694452.2022.2094326

Barua, Maan. 2021. "Infrastructure and Non-Human Life: A Wider Ontology." *Progress in Human Geography*. https://doi.org/10.1177%2F0309132521991220

Burkill, Isaac Henry. 1925. "I. H. Burkill diary, 1913–1925." *Biodiversity Heritage Library*. https://www.biodiversitylibrary.org/item/256593#page/4/mode/1up

Burkill, Isaac Henry. 1923. "The Historical Aspect of Certain Local Industries." *Singapore Naturalist* 2: 34–43.

Burkill, Isaac Henry and P. C. Cowley-Brown. 1916. "Locusts in Malacca." *Gardens' Bulletin, Straits Settlements* 1 (10): 337–49.

CABI 2008. Invasive Species Compendium. "*Imperata cylindrica* (cogon grass)." https://www.cabi.org/isc/datasheet/28580

Corbett, George Hamlin and N. C. E. Miller. 1936. "The Oriental Migratory Locust (*Locusta migratoria manilensis* Meyen) and the Bombay Locust (*Patanga succincta* L.) in Malaya." Kuala Lumpur: Department of Agriculture.

Dobby, E. H. G. 1942. "Settlement Patterns in Malaya." *Geographical Review* 32 (2): 211-32.

Greatrex, Jack. Forthcoming. "'Back to the Jungle': Investigating Rats, Scrub Typhus, and Plantations in the Federated Malay States, 1924–1942." *Medical Anthropology*.

Hillier, Maurice. "Malacca Memories." 1961. 103/3/5 Royal Commonwealth Society Library. Cambridge, United Kingdom.

Joniak-Lüthi, Agnieszka. 2020. "A Road, a Disappearing River and Fragile Connectivity in Sino-Inner Asian Borderlands." *Political Geography* 78: 1–11. https://doi.org/10.1016/j.polgeo.2019.102122

Kathirithamby-Wells, Jeyamalar. 2005. *Nature and Nation: Forests and Development in Peninsular Malaysia*. Singapore: NIAS Press.

Kaur, Amarjit. 1980. "The Impact of Railroads on the Malayan Economy, 1874–1941." *Journal of Asian Studies* 39 (4): 693–710.

Kirksey, Eben. 2015. *Emergent Ecologies*. Durham, NC: Duke University Press.

Malaya Tribune. 10 September 1915. "Kuala Lumpur D. P. A.": 2.

O'Dempsey, Tony. 2014. "Singapore's Changing Landscape Since c. 1800." In *Nature Contained: Environmental Histories of Singapore*, edited by Timothy P. Barnard, 17–48. Singapore: NUS Press.

Pratt, Harry Charles. 1913. "The Locust Pest in Malaya. A Short Survey and a Brief Description of its Life History." *Agricultural Bulletin of the Federated Malay States* 2 (4): 76–80.

Raffles, Hugh. 2007. "Jews, Lice, and History." *Public Culture* 19 (3): 521–66.

SFPMA, *Singapore Free Press and Mercantile Advertiser*. 21 January 1914. Untitled article: 6.

Straits Times. 8 January 1913a. Untitled article: 8.

Straits Times. 31 March 1913b. Untitled article: 2.

TNA, National Archives, United Kingdom. CO 576/10. "Report of the Director of Agriculture for the Year 1912."

Wright, Arnold and H. A. Cartwright, eds. 1908. *Twentieth Century Impressions of British Malaya: Its History, People, Commerce, Industries, and Resources*. London: Lloyd's Great Britain Publishing Company.

Acknowledgments

All newspapers come courtesy of the National Library of Singapore, NewspaperSG.

Cite as:

Greatrex, Jack. 2022. "Swarming Infrastructures." *Roadsides* 8: 51-57. https://doi.org/10.26034/roadsides-202200808

Jack Greatrex is a Postdoctoral Research Fellow at Nanyang Technological University, Singapore. He recently completed a PhD on the bodily, discursive, economic and infrastructural histories of creatures classified as pests in colonial Hong Kong and Malaya, undertaken at the University of Hong Kong. Before this, he read the world history MPhil and the undergraduate history tripos at the University of Cambridge. His research is located at the conjunctions of colonial, environmental, medical and multi-species histories in Asia and the Pacific.

ISSN 2624-9081 • DOI 10.26034/roadsides-202200809

Rethinking the Failure of Waste Infrastructures with Jackals

Ognjen Kojanić

Golden jackals have lived on the territory of modern-day Serbia for centuries, if not longer, but their population has boomed since the beginning of the 1980s (Penezić and Ćirović 2015).[1] As the jackal population has expanded, human–jackal encounters have become more common, and local media even carry stories of jackals attacking pets in backyards. Media accounts of human–jackal encounters typically focus on the failure of citizens to dispose of their trash properly, creating small-scale 'wild garbage dumps' (*divlje deponije*) that attract the animals. This article offers a critical approach to these anthropocentric media accounts of jackals, which invoke an undifferentiated human subject responsible for the jackals' proliferation. Based on conversations with local environmental activists, it considers the failures of the large-scale waste infrastructure created by industrial and state actors, and proposes a rethinking of the complexity of multispecies encounters in a damaged peri-urban environment.

[1] The same phenomenon has been observed elsewhere in the Balkans (Tănăsescu and Constantinescu 2019).

"Predators around Belgrade"[2]

"Our relationship to nature is responsible to a great extent for the fact that there are so many jackals." So explained the head of the Museum of Natural History in Belgrade on RTS, the national broadcaster, in 2019: "We have open landfills and garbage dumps in which we dispose of organic waste, so the jackal finds a large amount of food… We have known for a long time that our garbage dumps are not fenced." In response, other media outlets published their own stories on the topic under sensationalist headlines. *Telegraf* warned that "Jackals are encircling cities: They rule in places without wolves or hunters, and where wild garbage dumps proliferate." *Djole Dog* went with "Jackals in Belgrade: An example of man's irresponsibility toward nature."

[2] This is the title of a 2019 article about jackals that ran in Novosti.

Pančevački Rit, where many encounters with jackals have taken place, is an area on the northern bank of the River Danube. This "patchy Anthropocen[ic]" landscape (Tsing et al. 2019) has been shaped through drastic infrastructural transformation in the twentieth century: approximately ninety kilometers of dikes were constructed to protect the floodplain from seasonal inundation, a series of canals was dug to regulate the groundwater level and several pumps were installed to remove excess water. This area used to be primarily agricultural but has been urbanizing rapidly. According to the 2011 census, it was inhabited by approximately sixty thousand people; that number had doubled since 1981 (Statistical Office of the Republic of Serbia 2014).

The waste from Pančevački Rit is supposed to be discarded at a sanitary dump located on the city's southern fringe – just one in a city of more than a million inhabitants – yet that waste infrastructure is often described as failing (Star 1999). The implication of the explanation offered by head of the Museum of Natural History and other biologists is that the presence of jackals in Pančevački Rit was inextricably tied to the failures of existing waste infrastructures; a surfeit of food represented by the organic matter improperly disposed of by humans allowed the jackals' proliferation. Similar examples of animals' interaction with waste are highlighted in scholarship on urban ecologies (Doherty 2019). To the extent that jackals are feeding on organic matter from small-scale garbage dumps, one could see them as contributing to reducing the amount of waste. However, jackals are not appreciated in Serbia; in fact, occasional attacks on pets or small livestock make many people afraid. Hunters are permitted to shoot them year-round, and are even encouraged to do so in local campaigns.

A rare example of appreciation for jackals was presented by Tijana,[3] a popular educator focused on urban ecosystems whom I interviewed in early 2022. She praised these animals' ingenuity and called them "a functional part of the system" that nevertheless remains largely invisible to the majority of the population. "The jackal's role as a decomposer is unbelievable. One could write poetry devoted to jackals in cities." Tijana lamented the fact that people are afraid of this species. "They have been here the whole time and they are doing their job," she remarked. Similarly, the biologist interviewed by RTS pushed back against the idea that jackals should be exterminated, saying that they are "hygienists on duty" (*dežurni sanitarci)*.[4] Although other media reprinted this statement, the bulk of the coverage preferred to focus on wild garbage dumps.

[3] I use pseudonyms to refer to my interlocutors.

[4] His answers were informed by the work of other biologists who studied jackals (see Penezić and Ćirović 2015; Ćirović, Penezić and Krofel 2016).

Not All Wild Garbage Dumps Are Created Equal

Wild garbage dumps are an object of prime concern in Serbian environmentalist vernacular, yet the category is amorphous. Officially, wild garbage dumps are defined in the Serbian Law on Waste Management as public spaces where "various kinds of waste are disposed of in an uncontrolled manner" (*nekontrolisano odložene razne vrste otpada*), and which do not fulfil the conditions defined by the regulations on waste disposal (Batrićević 2017: 109–10). Any large amount of litter that is disposed of outside the official municipal waste system can fall into this category, but there are important differences in kind and volume. Most commonly, they take the form of individual households' trash, which can occur for several reasons. For instance, citizens might dispose of their waste improperly when trash collection happens infrequently and garbage receptacles overflow, or because arranging the collection of bulky material is onerous or pricy. In any case, media reports blame individuals rather than systemic factors. In media interviews, the head of the museum and other biologists referred to a study by Penezić and Ćirović (2015) on jackal diet in Serbia, which shows that it mainly consists of offal left on the roadside after the slaughtering of domestic animals and from hunting game. Media reports, however, did not dwell on these specifics, but rather talked about wild garbage dumps in general.

Mirko, a member of an environmental organization focused in particular on questions of pollution, told me in the summer of 2021 about confronting big industrial polluters in Pančevački Rit. A frozen food producer, for instance, created multiple dumps by disposing of surplus biomass mixed with the liquids used to clean vats. This biomass

← A mix of biomass and acids used for cleaning industrial vats dumped into fields by a local frozen food producer. Photo: EKO Pančevački Rit, 2017.

→ A company that processed slaughterhouse waste went bankrupt and left behind almost two hundred tons of bones. Photo: EKO Pančevački Rit, 2019.

attracted animals, some of which allegedly died after feeding there. Another dump was revealed after the bankruptcy of a company that had processed slaughterhouse waste. "When you shuffle it around," Mirko recounted disgustedly, "underneath half a meter of those dry bones on the top, you find bones with sinew, skin, parts of meat." Dumps like this attract rats, jackals and other carrion-eaters.

Sandra is a member of a different environmental association leading the struggle against the Belgrade city government's plans to convert the area around Bara Reva, or Reva Pond, into an industrial zone. During our conversation in 2021, she emphasized the beauty of the area: "We literally have exotic birds, the nature is gorgeous, and everything is close to [the center of] Belgrade." The plans included a landfill for disposing of construction debris. She was baffled that the city government had "decided to put all the worst things in the most beautiful area."

Construction debris landfill that was supposed to cover Reva Pond and the surrounding forest.
Photo: Bela Čaplja 1165, 2022.

Mirko's efforts to remove the two dumps were eventually successful. It took a considerable amount of public pressure for state authorities to withdraw their tacit approval and help clean up the dumps. The Bara Reva landfill ultimately covered thirty hectares of the bog and its surrounding forest before Sandra and other activists blocked further landfilling. The official planning document still proposes the disposal of construction debris in this area, despite massive public outcry. In all of these cases, there are no

official assessments of environmental damage, although such harm is conspicuously present.

Wild Animals and Wild Garbage Dumps

Biologists who discussed the booming jackal population did not mention large-scale dumps created by industrial polluters or the government's plans to establish them. Instead, they focused on the behavior of individuals. The media further linked the biologists' statements with the widespread concern about wild garbage dumps. The wider framing of the problem thus hid more than it revealed about ecological damage in this rapidly urbanizing area. Through claims that "we are not behaving responsibly toward nature," an undifferentiated subject appeared responsible for the jackals' appearance. The complexity of changing animal behavior was reduced to a single cause: littering. Scientific analyses referenced by the biologists do show the importance of offal in jackals' diet, but those studies were not conducted in Pančevački Rit. While there are small unsanitary dumps created by individuals, it is questionable whether jackals would find offal in those locations like they could in other, more rural parts of Serbia where animal slaughter at home is more common.

In addition to being disposed of in official municipal landfills, the ever-growing amount of waste Belgraders create may in fact need to be managed by more-than-human efforts – perhaps as part of a multispecies infrastructure of waste (Morita 2017). This is not to say that individually created wild garbage dumps, where animals can perform an instrumental role, are necessarily better than industrial-scale ones and should be promoted. Instead, it is a recognition that there is a qualitative difference between offal on the side of the road that jackals can consume and the large-scale dumps that Mirko and Sandra were fighting. The latter are far more detrimental to the wider environment, and confronting them requires a critique of systemic failures of waste infrastructures rather than of individuals. Awareness of these differences and the emerging relationship between humans and jackals can ground a different relationship to waste and the infrastructures through which it is managed.

References:

Batrićević, Ana. 2017. "Nepropisno odlaganje otpada u Srbiji – aktuelno stanje i kaznenopravna reakcija." *Zbornik Instituta za kriminološka i sociološka istraživanja* 36 (1): 107–22.

Ćirović, Duško, Aleksandra Penezić and Miha Krofel. 2016. "Jackals as Cleaners: Ecosystem Services Provided by a Mesocarnivore in Human-Dominated Landscapes." *Biological Conservation* 199 (July): 51–5.

Doherty, Jacob. 2019. "Filthy Flourishing: Para-Sites, Animal Infrastructure, and the Waste Frontier in Kampala." *Current Anthropology* 60 (S20): S321–32. https://doi.org/10.1086/702868

Morita, Atsuro. 2017. "Multispecies Infrastructure: Infrastructural Inversion and Involutionary Entanglements in the Chao Phraya Delta, Thailand." *Ethnos* 82 (4): 738–57.

Penezić, Aleksandra and Duško Ćirović. 2015. "Seasonal Variation in Diet of the Golden Jackal (Canis Aureus) in Serbia." *Mammal Research* 60 (4): 309–17.

Star, Susan Leigh. 1999. "The Ethnography of Infrastructure." *American Behavioral Scientist* 43 (3): 377–91.

Statistical Office of the Republic of Serbia. 2014. "Попис становништва, домаћинстава и станова 2011. у Републици Србији. Упоредни преглед броја становника 1948, 1953, 1961, 1971, 1981, 1991, 2002 и 2011. Подаци по насељима // 2011 Census of Population, Households and Dwellings in the Republic of Serbia. Comparative Overview of the Number of Population in 1948, 1953, 1961, 1971, 1981, 1991, 2002 and 2011. Data by settlements." Belgrade. https://pod2.stat.gov.rs/ObjavljenePublikacije/Popis2011/Knjiga20.pdf

Tănăsescu, Mihnea and Ștefan Constantinescu. 2019. "How Knowledge of the Golden Jackal (*Canis aureus*) is Formed: Report from the Danube Delta." *Environmental Values* 28 (6): 665–91.

Tsing, Anna Lowenhaupt, Andrew S. Mathews and Nils Bubandt. 2019. "Patchy Anthropocene: Landscape Structure, Multispecies History, and the Retooling of Anthropology: An Introduction to Supplement 20." *Current Anthropology* 60 (S20): S186–97. https://doi.org/10.1086/703391

Acknowledgements:

Research for this article has been supported by the Wenner-Gren Foundation and the Alexander von Humboldt Foundation. I am grateful to the editors of the special issue and the reviewers for *Roadsides*, as well as to Shelby Brewster, Franz Krause, Vanina Santy and Sandro Simon for their useful comments on earlier versions.

Cite as:

Kojanić, Ognjen. 2022. "Rethinking the Failure of Waste Infrastructures with Jackals." *Roadsides* 8: 58-64. https://doi.org/10.26034/roadsides-202200809

Ognjen Kojanić (PhD, University of Pittsburgh) is a Humboldt Postdoctoral Research Fellow at the University of Cologne. His expertise is in the anthropology of political economy with a geographic focus in Eastern Europe. His first book project, tentatively titled *Reluctant Owners: Managing Labor, Class, and Institutions in Postsocialist Capitalism*, focuses on the case of a worker-owned machine tool factory in Croatia to examine the material basis for everyday working-class politics. In his current research project, he examines how different political-economic regimes materially shape the politics of human–environment relations in Serbian wetlands, aiming to identify and analyze competing ideas and practices of relating to historical wetland landscapes at the level of broad political-economic regimes, discourses, expert and lay knowledge, and political interests.

ISSN 2624-9081 • DOI 10.26034/roadsides-202200810

Rats and Sewers:

Urban Modernity Beyond the Human

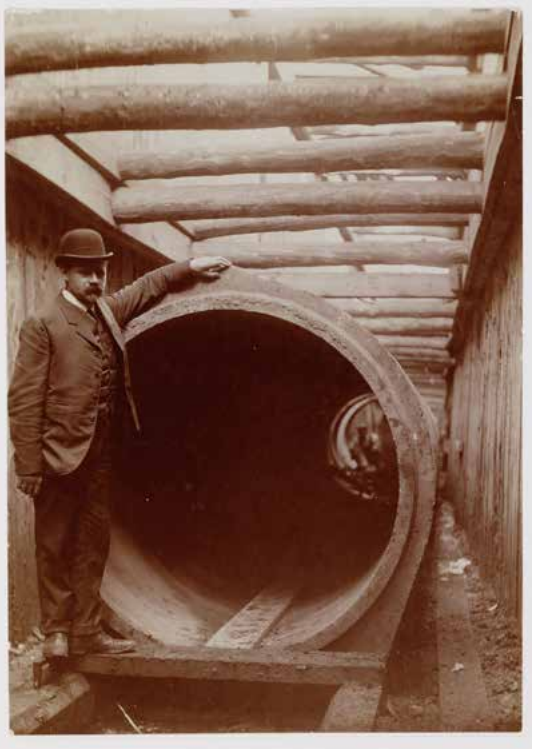
Herre de Bondt and Rivke Jaffe

This brief essay discusses how urban modernity is constructed in a more-than-human fashion, through interactions and relations between humans, infrastructure and animals. We focus on the case of Amsterdam, drawing on historical studies and on research we conducted with present-day urban residents in the rat-affected neighborhoods of Slotermeer and Rivierenbuurt and with public health professionals in 2020.[1] We show how conceptualizations of urban modernity – and of what constitutes a bacteriologically and aesthetically clean city – are reconstituted over time, suggesting that aspirations to materialize such ideals are mediated by sewage infrastructure and rats. Historical scholarship on sanitary reform has emphasized the role of infrastructural works in reconfiguring human–nature relations in cities, as sewers helped to control and invisibilize wastewater flows. In addition, we suggest, sanitary infrastructure – sewers, but also new chemical systems – also helped shape 'modern' human–rat relations. In twenty-first-century Amsterdam, we see a new iteration of human–animal–infrastructure relations, as the governance of the brown rat (*Rattus norvegicus*) is framed in terms of coexistence rather than eradication, and an otherwise unwelcome species is being revalued for its work in keeping sewers clean.

[1] Conducted October–December 2020, this research involved forty interviews with residents of these neighborhoods as well as public health and housing professionals, and participant observation with pest management professionals during neighborhood-level inspections.

Constructing Sanitary Cities, Removing Rats

Urban scholars have argued that the construction of large-scale sewer systems, starting in the nineteenth century, was central in producing the modern city. Removing wastewater and specifically human feces not only represented a public health revolution; these infrastructural works were part of a broader movement of sanitary reform that involved new ideologies of cleanliness and proper modern conduct. The physical and technological transformations that these infrastructural works involved were accompanied by shifting cultural views on the appropriate relations between society and nature – the modern city was a locus of culture and technology, and the only sanctioned role of urban nature in this new context was to offer aesthetically pleasing space for leisure and contemplation (Gandy 2004).



Sewer construction, Amsterdam, 1910–12. Copyright: Stadsarchief Amsterdam, CC0.

While such scholarship has highlighted the political materiality of infrastructure, it has engaged less with the role of nonhuman animals in the imagination and physical realization of the modern city. Yet their framing in terms of both nature and modernity shifted as well. As advances in medical science supplied new insights into the role of human and nonhuman disease vectors, certain animals emerged as "epidemic villains" (Lynteris 2020). Unsurprisingly, these villains included rats, which were identified as a vector for bubonic plague and more broadly came to be seen as unhygienic, aesthetically displeasing "trash animals" (Nagy and Johnson 2013) that clashed with urban modernity. This shift was not separate from infrastructural developments: the modern city's sewage infrastructure not only removed human waste, it also helped urban rat populations disappear from view, affording them a new underground home that came to be seen as their natural habitat.

Collection of rodenticide at Amsterdam's public health service, 2 November 1959.
Copyright: Nationaal Archief, CC0.

Rat control operation in Kattenburg, Amsterdam, 21 July 1965.
Copyright: Nationaal Archief, CC0.

In Amsterdam, a combination of cesspits and the city's famous canal system long served as the main infrastructure for wastewater removal. In the wake of three deadly cholera epidemics in the mid-nineteenth century, and as epidemiological insights became more widespread, so-called hygienists such as Samuel Senior Coronel and Samuel Sarphati agitated for sanitary reform. In 1906, the municipal authorities initiated the development of underground sewage infrastructure.

The capacity of the sewage system to make rats disappear underground, along with the wastewater, proved unsatisfactory. Attempts to control these 'epidemic villains' soon involved extending the sanitation infrastructure beyond the sewage system to include other, more mobile sociotechnical components, notably rodenticides. In the mid-twentieth century, Amsterdam's public health service organized a concerted campaign, providing citizens with rat poison and sending extermination teams into areas where rats ran rampant.

These various efforts can be seen as directly aligned with conceptions of the hygienist, sanitary city circulating globally at the time (Engelmann 2018). A modern city was one in which infrastructure was mobilized to remove both sewage and 'trash animals' from sight – or at least from the urban surface – through a sociotechnical system combining material, chemical and human elements. Like other modern cities, Amsterdam sought to distinguish and segregate good and bad forms of nature, establishing parks for leisure and zoos with exotic animals for contemplation, while removing human waste and waging a war on rats.

Living with Invisible Waste Workers

In contemporary Amsterdam, nineteenth and twentieth-century conceptualizations of rats as bad nature have begun to shift, as cities are increasingly understood as urban ecological formations co-constituted by humans and nonhumans. A new normative framing is slowly emerging, in which coexistence is slowly displacing extermination. In research we carried out in 2020, residents of rat-affected neighborhoods regularly described rats as an inherent part of urban life – arguing, for instance, that "the infestation of rats in Amsterdam is older than Amsterdam itself." In these interviews, numerous residents situated rats within the city's larger ecosystem, expressing a recognition that rats' ecological role might benefit humans. "I can only assume that rats have a role in the ecosystem in one way or another, that they are useful in some way," one resident concluded; "Maybe they eat something that inconveniences me, like mosquito larvae or baby mice." Such statements clearly acknowledged Amsterdam's more-than-human urban ecology, recognizing and revaluing rats' interspecies entanglements.

Sewage infrastructure plays a crucial role in facilitating alternative readings of human–rat relationships. It continues to serve its modern function of rendering rats unseen – many of our interlocutors stressed that they preferred not to see rats – and sewage pipes afford this invisibility. However, the sewers are also a site where rats conduct waste work that is arguably invaluable to the modern city (Holmberg 2021). Rats' association with waste is not only negative: it affords them a framing as waste workers as they consume 'fatbergs' that form within sewage pipes. In the process, they prevent

the pipes from clogging and stop sewage from backing up. As one resident remarked, "[rats] undoubtedly do good work, they tidy up part of our mess." At the same time, Amsterdam's rats inadvertently disrupt urban infrastructure – they damage sewage pipes as they gnaw through them to gain access to food, shelter and transit routes. Meanwhile, their burrowing activities also cause sidewalks across the city to cave in. While most of the rats causing these forms of destruction remain invisible, those individuals that do venture aboveground may still elicit human reactions of disgust – especially when they emerge not in parks but in private homes, as happens on occasion in Amsterdam (de Graaff 2021). While such disruptions confirm longstanding perceptions of rats as problem animals, we see an emergent shift in which anthropocentric ideologies of cleanliness are complemented by an urban ecological perspective, in which interspecies coexistence and the value of nonhuman life become more prominent.

Elephant assisting with sewer construction in Amsterdam's Artis Zoo, early twentieth century. Copyright: Stadsarchief Amsterdam, CC0.

This reframing of rats as a normal and natural part of Amsterdam's urban ecology, informed by rat–sewer entanglements, is reflected in the twenty-first-century governance of these rodents. Where previously extermination was the conventional response, the public health service has recently shifted towards a policy of integrated pest management (IPM). This change acknowledges that striving for population control, and particularly extermination, is ultimately unrealistic, and that rodenticide use carries broader ecological risks. Additionally, IPM emphasizes that pest management involves many other stakeholders than merely the public health service. Various actors – from shop owners to housing corporations – should attempt to manage Amsterdam's rat

population by minimizing rats' access to waste. The shift from control to management, a perspective emphasized in IPM's integrated approach, acknowledges the rats' agency to some extent. An internal municipal report outlining the shift to IPM described urban animals including rats as valuable, noting that they can serve as indicators of the quality of public space. The report stressed that "rats eat fat from sewage pipes and, in the process, help with the maintenance of the sewage system" (Gemeente Amsterdam 2018: 6, translation by authors). In its multi-stakeholder approach, then, Amsterdam's twenty-first-century sanitation policy also acknowledges and values the work done by nonhuman residents (cf. Barua 2019; Besky and Blanchette 2019; Zhang 2020).

Conclusion

In Amsterdam and beyond, the construction of urban modernity has relied on infrastructural projects that render unsanitary matter invisible, while confining urban nature to carefully planned locales. While analyses of sewage system construction highlighted the ability to remove waste from urban environments, we suggest that this focus on inanimate flows has overlooked how infrastructural development also reorganized relations between humans and sentient, nonhuman life. Sewers also afforded rats – an unpopular, biohazardous 'trash animal' – mobility, food and a place to hide from human eyes. This proved insufficient in balancing their reputation as 'epidemic villains', and the sociotechnical system of urban sanitation infrastructure expanded to include large-scale extermination efforts using rat poison. In the twenty-first century, however, the growing recognition of the city as an urban ecological system is beginning to challenge the desire to control and segregate nature. Rats are increasingly accepted or even valued for their waste work and ecological role. The sewers need rats in order to stay unclogged, while in turn the sewage infrastructure continues to help keep the animals out of human sight. Understanding shifting conceptions of the modern city requires a more-than-human approach that considers rats and sewage infrastructure together.

References:

Barua, Maan. 2019. "Animating capital: Work, commodities, circulation." *Progress in Human Geography* 43 (4): 650–69.

Besky, Sarah and Alex Blanchette (eds.). 2019. *How Nature Works: Rethinking Labor on a Troubled Planet*. Santa Fe, NM: SAR Press.

De Graaff, Sam. 2021. "Rivierenbuurt kampt met rattenplaag: 'Sprongen zelfs uit de wc'." *Parool*, 27 January.

Engelmann, Lukas. 2018. "Fumigating the hygienic model city: Bubonic plague and the Sulfurozador in early-twentieth-century Buenos Aires." *Medical History* 62 (3): 360–82.

Gandy, Matthew. 2004. "Rethinking urban metabolism: water, space and the modern city." *City* 8 (3): 363–79.

Gemeente Amsterdam. 2018. *Meerjarenplan omgang overlastgevende dieren 2019–2022*. Internal report.

Holmberg, Tora. 2021. "Animal waste work. The case of urban sewage management in Sweden." *Contemporary Social Science* 16 (1): 14–28. https://doi.org/10.1080/21582041.2019.1630669

Lynteris, Christos (ed.). 2019. *Framing Animals as Epidemic Villains: Histories of Non-Human Disease Vectors*. Cham: Springer Nature.

Nagy, Kelsi and Phillip David Johnson II (eds.). 2013. *Trash Animals: How We Live with Nature's Filthy, Feral, Invasive and Unwanted Species*. Minneapolis, MN: University of Minnesota Press.

Zhang, Amy. 2020. "Circularity and enclosures: Metabolizing waste with the black soldier fly." *Cultural Anthropology* 35 (1): 74–103.

Cite as:

de Bondt, Herre and Rivke Jaffe. 2022. "Rats and Sewers: Urban Modernity Beyond the Human." *Roadsides* 8: 65-71. https://doi.org/10.26034/roadsides-202200810

Herre de Bondt is a PhD Candidate in Anthropology at the University of Roehampton. With a background in anthropology and urban studies, he is interested in the ways nonhuman animals inform and shape the contemporary city. Gulls in The Hague, Tokyo's crows, rats in Amsterdam, and a variety of bird species in London have guided his research into multispecies relations. Herre is interested in how more-than-human assemblages challenge anthropocentric ways of thinking and how nonhuman animals have and are afforded political significance. He is currently part of the Wellcome Trust-funded project "From Feed the Birds to Do Not Feed the Animals."

Rivke Jaffe is Professor of Urban Geography at the University of Amsterdam. Connecting geography, anthropology and cultural studies, her research focuses primarily on intersections of the urban and the political. She is specifically interested in how urban inequalities are mediated, reproduced and transformed in more-than-human ways, by nonhuman entities from digital technologies to animals. Her current work studies security dogs in Kingston, Jamaica.

ISSN 2624-9081 • DOI 10.26034/roadsides-202200811

Elephants as Prospecting Infrastructure

Jacob Shell

Introduction

Transportation by way of trained Asian elephants lingers on in the Hukawng Valley region of Kachin State, northern Myanmar (Burma), for three interrelated reasons. One, monsoon-season flooding and mudflows here are especially severe, rendering all but the best engineered roads intermittently unusable by motor vehicles between early July and October. Asian elephants, in contrast to wheeled vehicles, are mobile across the muddy monsoon landscape, offering *vadological mobility* (Shell 2021): transport via fording and mud-climbing skills across geomorphologically transient features.

Two, the ongoing conflict between the Kachin Independence Army (KIA) and the Burmese Myanmar Armed Forces (Tatmadaw) has given the former an incentive to maintain an off-road, clandestine mobility system. The KIA operates elephant transport convoys worked by some fifty to sixty elephants; these convoys move cargo via pathways hidden by the forest canopy and which are difficult to follow for those who lack elephants of their own.[1] This demand for *evasive* or *subversive mobility* (Shell 2015) thus contributes an added incentive for local civilian Kachin and Hkamti elephant riders to continue their practice of capturing and training forest elephants to become working animals.

[1] For reasons why the Tatmadaw does not have its own elephant convoys, see Shell 2019.

Elephants assist in transportation of people and cargo to Internally Displaced Persons Camps in Tanai and Myitkyina. Photo: Jerome Palawng Awng Lat, 2018.

Finally, elephants are valuable for prospecting, retrieving and hauling the forest-drawn natural resources with which the Kachin forest is rich: timber, bamboo and mined gems. Because these natural resources are somewhat unpredictable in where they appear, the usual advantages of spatially fixed road networks are negated in favor of transport that is flexible across the sylvan expanse. Off-road prospecting, to identify remote seams of newly discovered gemstones, is at a spatial advantage relative to prospecting that is road-bound. Trained transport elephants thus provide a means of *prospecting mobility*. Like Afghan camels used in the prospecting of the Australian Outback during the nineteenth and early twentieth centuries (Shell 2015), the elephant–human working relationship in Kachin State realizes a kind of prospecting infrastructure.

In this article, I focus on this third orientation of elephant-reliant mobility, in particular with regard to amber prospecting and extraction. However, the figure of the sylvan prospector on elephant-back is always potentially other kinds of figures as well: the rebel, a porter holding together a distinct social geography, a rescuer of people stranded during monsoon flooding, and so forth.

Mesozoic Amber and Environmental Footprints

The northern Burmese deposits are the world's largest known amber concentration dating from the Mesozoic Era and containing biota (insects, dinosaur claws, feathers, bits of plant matter) from that archaic time (Grimaldi et al. 2002). The amber does not contain preserved DNA, but it is nonetheless of great importance from the vantage point of evolutionary biologists and paleontologists. This aspect sets it apart from the other two gemstone/precious metal resources of the region: jade and gold. While these are judged narrowly for their economic value, Hukawng amber, by contrast, has high epistemic value for international scientists, potentially giving Kachin State and involved economic parties wider bargaining power.

Human rights groups disagree as to the desirability of Burmese amber mining, arguing that the profits flow into the arms trade and civil warfare (Nitta 2020; Poinar and Ellenberger 2020). However, from a strictly environmental perspective, amber mining in the region has been far less ecologically destructive than jade mining or gold panning, both of whose profits also flow through the war activities. Jade deposits are spread fairly homogeneously across some twelve square miles at the headwaters of Uyu River, an area known as Hpakant. This entire region has been heavily deforested, and topographically turned inside out, via the process of industrial-scale mining with particularly bleak work conditions. Gold panning, which occurs on many sylvan river systems throughout Kachin State, tends to be environmentally destructive as well, because of the constant dredging activity (Papworth et al. 2017).

Amber deposits tend to be smaller in geographic scale. Virtually all of the Kachin amber currently comes from a single mining zone near Noije Bum. If the environmental destruction wrought by the Hpakant jade mining is visible from space, the area of Noije Bum is still, at least from above, a well-canopied jungle. In part, this contrast between the vastness of the Hpakant jade operations and the relatively light environmental footprint of the Noije Bum amber mining reflects a difference in scale of economic extraction. China is the main jade customer in the world and the black-market flow of this gem to China has been estimated to be equivalent to nearly half of Myanmar's official GDP (Global Witness 2015). While the full economic scale of amber extraction remains obscure, it does not even begin to approach that of the jade. Nevertheless, even if demand for Kachin amber were to become more pronounced, it is doubtful that the intensity of environmental destruction would ever resemble what has happened at Hpakant. The spatial layout of jadeite deposits is limited by the extent of local geological subduction between continental plates, and the presence of the jadeite is also relatively dense. Amber, on the other hand, originates from primordial forest expanses. Due to the nature of this genesis, further amber deposits beyond Noije Bum are likely to be both more regionally diffuse and less homogeneous in their expanse.

Elephants, Gems and Roads

Elephant-reliant transportation is relevant to both jade mining and amber extraction. The connection of elephant-reliant transportation to the jade industry centers upon the interrelationship of clandestine and flood-season mobilities. Various Kachin elites

The Noije Bum amber mines (above) and the Hpakant jade mines (below). Both satellite images are at the same scale: roughly 5 miles across.
Source: Google Satellite Imagery, 2021.

are in control of some of the Hpakant jade mines. However, the formal road network between Hpakant and the Chinese border, where nearly all jade flows for sale, is controlled by the Myanmar Armed Forces, whom Kachin jade-traffickers often seek to avoid. Throughout the 2010s, Kachin elephants marched and swam two off-road routes from the jade-mining zone to the KIA's administrative capital of Laiza, which sits on the border with the Chinese province of Yunnan. This is not to say that most jade was getting to China on elephant-back. Rather, the animals assisted in strategic short-haul operations to take jade off-road, from one roadside depot to another, responding to reconfigurations in the surveillance geography along the road network as the central military's deployment of personnel and equipment ebbed and flowed (Shell 2019).

Monsoon season also reconfigures the local geography of usable roads. While monsoon-proofing a road is feasible in theory by elevating it, blocking mudflows or building concrete runoff channels, no roads in the Hukawng Valley have received this level of investment. The most important road across the valley is the former Ledo Road, built in the 1940s. While this road received some engineering improvements during a recent period of economic reforms, it remains extremely closure-prone during monsoon flooding. Hence, one of the ways that elephant owners and riders near Hpakant have of making seasonal cash is to ride their elephants up and down the branch road from the jade mines to the Ledo Road, looking for motor vehicles that have become trapped in the mud, and offering to dislodge them.

Dislodging an automobile from the mud, along the road to Hpakant.
Photo: Hkun Lat, 2011.

In amber mining, transport elephants loom large again as they carry provisions for the miners in Noije Bum. Roads between this mining area and the main road system are little more than muddy forest tracks, so elephants are crucial also for getting the extracted gems to roadside depots for eventual motorized transport to the big amber market in Myitkyina – the capital of Kachin State. It is here, too, that the elephants shine as prospective infrastructure: by providing access to otherwise prohibitive terrain, they facilitate exploration of new seams elsewhere in the region (Xing et al. 2020).

The continued use of trained elephants in prospecting amber seams is possible thanks to the evolutionary adaptation of these animals to exist in a forest environment. What is also significant, from an ecological point of view, is that elephant-based exploration allows extraction patterns which leave the forest canopy largely intact. This relative

maintenance of forest integrity brings numerous benefits to the environment and to the elephants themselves: the transport elephants in the forest can live longer lives and produce more offspring, compared to those in a walled compound. This is true of both wild and trained elephants, if the latter are released into the forest on a nightly basis to eat, sleep and find mates, as is conventional practice throughout Myanmar.

Conclusion

Political peace or some kind of enforced stalemate will eventually come to Myanmar, to Kachin State and to Hukawng Valley, and when it does, certain economic and environmental questions will take on new importance. Many of Kachin State's roads need to be flood-proofed – but which ones and going where? Kachin State has one of mainland Asia's largest zones of contiguous tropical-subtropical forest – what should happen with this extraordinary environmental resource? The region also has one the last remaining concentrations of transport elephants who live between a state of pure captivity and wildness. What role will they play in a future Kachin State with monsoon-proofed roads and reduced need for secretive transport operations?

The prospecting of Mesozoic amber may contain particular promise for the future of the Hukawng district, and the elephant as means-of-prospecting would prove important for such activity. As a means of transportation, the Asian elephant only becomes obsolete once an array of geospatial relationships and conditions has disappeared. If there are no forest camps reachable only by muddy trail, no clandestine organizations with evasive or subversive mobility needs, and no prospecting frontiers with the power to intrigue, then and only then does elephant-reliant transport become a truly archaic techno-mobility form, outclassed by motorized equipment.

References:

Global Witness. 2015. *Jade: Myanmar's Big State Secret*. London: Global Witness.

Fisher, Jonah. 2015. "Myanmar Elite 'Profits from $31bn Jade Trade'." *BBC News*, 23 October.

Grimaldi, David, et al. 2002. "Fossiliferous Cretaceous amber from Myanmar (Burma): Its rediscovery, diversity and paleontological significance." *American Museum Novitates* 3361: 1–72.

Nature Ecology and Evolution Editorial. 2021. "Fossilized ethics." *Nature, Ecology and Evolution* 5: 703–4.

Nitta, Yuichi. 2020. "Myanmar amber traps scientists in ethical dilemma." *Nikkei Asia*, 8 June.

Papworth, Sarah et. al. 2017. "The impact of gold mining and agricultural concessions on the tree cover and local communities in northern Myanmar." *Scientific Reports* 7: 46594.

Poinar, George and Sieghard Ellenberger. 2020. "Burmese amber fossils, mining, sales, and profits." *Geoconservation Research* 3: 12-16.

Shell, Jacob. 2021. "Elephant riders of the Hukawng Valley: Evasive mobility and vadological geography." *Journal of Burma Studies* 25 (2): 261–98.

Shell, Jacob. 2019. *Giants of the Monsoon Forest: Living and Working with Elephants*. New York: WW Norton.

Shell, Jacob. 2015. *Transportation and Revolt: Pigeons, Mules, Canals and the Vanishing Geographies of Subversive Mobility*. Cambridge, MA: MIT Press.

Xing, Lida and Liang Qiu. 2020. "Zircon U-Pb age constraints on the mid-Cretaceous Hkamti amber biota in northern Myanmar." *Palaeogeography, Palaeoclimatology, Palaeoecology* 558 (15): 109960.

Cite as:

Shell, Jacob. 2022. "Elephants as Prospecting Infrastructure." *Roadsides* 8: 72-78. https://doi.org/10.26034/roadsides-202200811

Jacob Shell is an Associate Professor of Geography and Urban Studies at Temple University in Pennsylvania, United States. He is author of *Transportation and Revolt: Pigeons, Mules, Canals, and the Vanishing Geographies of Subversive Mobility* (MIT Press, 2015) and *Giants of the Monsoon Forest: Living and Working with Elephants* (WW Norton, 2019).