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States of the Wind: Dust Storms and a Political Meteorology of Contemporary China

By

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Abstract

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On New Year's Day, 2001, Beijing was struck by a massive dust storm, coursing through and glutting the city on the eve of a long-awaited Chinese century. On the backs of coursing winds and in the long, sandy wake of massive desertification afflicting inner, upwind China, dust storms portended a multi-faceted and multi-scaled environmental crisis in the coming, a shade on the glowing economic futures to which the Chinese party-state had yoked its post-Mao, post-ideological legitimacy. Combating dust storms in Beijing – and then, protecting places as far downwind as Seoul, Tokyo, and even the western US – introduced new political problems and actors into an emerging field of environmental governance, with the central government, through forestry agencies especially, scrambling to devise ways of holding the earth to the ground, against its dangerous tendency to lift into the air. In the course of this, geological, ecological, and meteorological things and processes came to the fore as problems of government.

My dissertation explores how dust and wind, in the first decades of the 2000s, were consequential in the elaboration of various emerging topologies of power. It explores how, in the Chinese Communist Party's brand of ecological governance, how ecology, sociology, and economy are re-assembled into elements in a shifting governmental topology, aimed at the stabilization of a shifty, desertified environment as well as the maintenance of 'social stability' against the economic and ecological ravages of desertification. In particular, I argue that in the ecological governance of sand and storms, new deployments of an infrastructural political logic are reorganizing both sandy landscapes and the peoples on them – each is figured as structurally unsound and in need of stabilizing state intervention. In this, environmental interventions at many scales think the country, its land, and its people, as elements in a variegated infrastructural program aimed at the control and stabilization of shifty things. It explores tree-walls, sand barriers, and sand ecology and engineering on one hand as polytechnic and scientific interventions into intervening into shifting landscapes. In tandem, it explores how 'environment' as a historically situated and multiple concept in China inspires new ways of ordering a populace that is also taken to be shifty and chaotic. Through multi-sited ethnography, it explores, along a dust storm's path, the emergent topologies of power that arise to confront dust and sand. This is a contribution to political and environmental anthropology, political ecology, China studies, and science and technology studies.

List of Figures

Acknowledgements

I spent much of the process of writing this document in the attempt at finding my voice, and realized, finally, that I knew all along: that each sentence of this dissertation, every thought I've ever experienced as my own, everything that I've held on to long enough for it to find its way onto the page or on the editing floor came from someone, someone else. Conversations in hallways or on Google chat while the seminar went somewhere else, the way in which the sun fell through a window to draw my eye to a mote of dust, the way my eyes scanned messages piling up in my inbox. So gratitude in the writing is not enough, and is not precise enough when I read myself and find myself suddenly hearing other people. It is as if life were always already a vicarious prospect, lived in the parallax of things that is an I. So thank you, then, not simply for listening and arguing with me. But rather, the deepest gratitude for the encounter and shifting of positions that found your voice in my own, the coincidence of time and life that found us in each other's proximity. It is the relations and environment that act through me that disperse authorship into a network that I will never be able to finally account for, and for which gratitude is only ever a gesture at an impossibility.

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Table of Contents

Introduction: States of the Wind

On New Year's Eve, December 31, 2000, an unusually dry winter combined with above-average temperatures found strong winter winds lifting exposed and unfrozen sand from Inner Mongolia into the air. Raising in a great wall of lifted earth, dusts moved eastward on the wind in a plume visible in satellite imagery, greeting Beijing on the first day of the new millennium in an unprecedented January dust storm. The prior year, 2000, had been described by the Chinese Meteorological Agency as the worst dust storm season in the 50 years since the founding of New China, in both frequency and intensity, with a record nine dust storms falling on Beijing. This number was only to be surpassed in 2001, with its eleven.

In Beijing, these storms wreaked havoc, blanketing and settling over the city with their characteristic yellow dusts, and glutting the shining infrastructures and skylines that were the city's new face to the world. In the city's air, they compounded the city's infamous pollution problem, driving measures of particulate concentration and air quality in all measures off the charts, and sparking a public health crisis for embattled breathers exposed to the air. They grounded airplanes at the terminals being constructed in preparation for the Olympic Games. Meteorological insecurity hung in and through the air as an atmospheric condition of urban life in the new Chinese city, whose air was a dense aerosol of suspended particulates, a confusion of states of matter.

Over the city, they suggested the city's relationship to other places through the genesis and motion of a storm. Desertification in the regions immediately surrounding Beijing, but especially much farther upwind in Chinese Inner Mongolia, in a dust storm, shifted from the process of massive ecological degradation that racked vast swaths of the Chinese north and southern Gobi past the frontier into Mongolia proper, but became a direct vector of meteorological danger to which the city was exposed. Over days, these storms over Beijing could strike the Koreas and Japan, after having also gathered air pollutants in their sojourn across the continent. In a week, the strongest storms could make landfall over the United States, where 'Chinese' pollutants have been established by California air quality management districts as an ancillary source of American pollution, a baseline against which 'domestic' pollution must be measured.

In the face of a gathering political storm in the capital, in 2001 then-Premier and champion of anti-desertification Zhu Rongji, left Beijing with a coterie of more than 350 party officials. They traced the dust storms to one of their purported sites of origin in nearby Hebei Province, and then all the way to western Inner Mongolia's Alxa Plateau, 600 miles and two days by dust storm from Beijing. Desertification had made each of these places a dusty threshold for the capital, and as the earth's surface collapsed into mobilized sand and dust, he narrated desertification not simply as a problem of local livelihood, but as an environmental threat looming just at Beijing's doorstep. Desertification, driven by 'irrational land use,' must be controlled, he argued, suggesting a wholesale remaking of upstream political economies. National newspapers pinned desertification on the waning environmental vigilance - and market-driven greed - of farmers and herders in a countryside eviscerated by out-migration. These echoed with a familiar devolution of blame in China's north for ecological degradation to a backwards rural population in need of control (see Williams 1996, 2002; Rossabi 2004, Bulag).

With Zhu's recommendation, the central government promised to release huge amounts of money for controlling desertification, "Six Billion for Dust Storm Source Control" to develop

a "Comprehensive Beijing Dust Storm Source Control Project Implementation Plan." Its main goal would be to reconstruct upwind China as a massive environmental infrastructure whose purpose was protect Beijing from dust storms in two ways. First, by forestalling the formation of dust storms at the places they originated through by re-engineering the earth's surface, under the slogan "blocking wind, fixing sand" (*fangfeng gusha*). Second, it demanded the construction of a line of environmental engineering projects running the length of China's 'Three Norths' (northwest, north, and northeast) region, a full 42% of its territory. Paralleling the span of the Great Wall, this 'Great Green Wall' of billions of trees – the 'largest environmental engineering project in human history,' according to the Chinese government – is the expression of a logic of topographical containment. These walls aim to arrest and sever the flow of dust-transporting airstreams before they cross the Wall to strike China proper. Like other contemporary walls, they are responses to disruption in the staid conditions of modern sovereignty (Brown 2014), but this time where it is the land itself that can be made to flow. They are a literalization of a territorial logic that aims to fix spaces in non-overlapping relation, a bid to secure, against the powers of the wind, the final fixity of the stony geo-body of the nation (Thongchai 1994).

To block storms where they originated, and then, to install a series of windbreaks and infrastructures along possible storm paths on their way to Beijing and other cities, the national anti-sand programs that followed from Zhu's inspection tour would increasingly aim at renovating the physical and social landscapes of upwind China. Dust storms and their revelation of Beijing as a point in the wind, subject to the meteorological fallout of upwind ecological disaster. And in tandem with the atmospheric city revealed in strings of storms, desertified places became related through Beijing as points in the city's dispersed airshed, subject to a renovation that would secure the capital from upwind dangers. Remaking the economies, ecologies, and topographies of the shifty sandscapes of inland China slated them as construction zones for a national infrastructure for dust control. The transformation of dunes into forests and of mountain passes into heavily fortified windbreaks were the expression of a novel form of environmental protection – downwind cities must be protected from the broken environments of places upwind.

Dust storms themselves plotted out a mode of environmental and spatial relation that would become both the condition and problem for a novel ensemble of political and governmental logics, techniques, and programs. The path of the wind shaped a new geography of state environmental interventions aimed ultimately at 'protecting Beijing' by stopping the wind in its tracks and dampening its powers to move an earth destabilized by desertification. This bid at environmental protection depended on the superimposition of a political geography of environmental interventions onto the flowing trajectories where capital-bound airstreams passed over desertified earth.

These engineering projects, emerging out of a shifting constellation of scientific and engineering, forestry and investment schemes, interface with the economic development initiatives that have long aimed to revive the inland Chinese countryside, 'left behind' in the economic miracle concentrated on the urbanized coastline. While solving major rural challenges in Reform had long focused central governmental efforts on the construction of a New Socialist Countryside (*Xin Shehuizhuyi Nongqu*), the ensemble of scientific, engineering, forestry, and political programs for anti-desertification and anti-dust storms envisioned rural politics as part of the construction apparatus for the infrastructuralization of a shifty continent. Arresting sand, dust, and wind meant that the rural problem could increasingly be understood in meteorological terms, so that governing and managing sand and society in Inner Mongolia gained traction precisely as

part of a massively distributed national campaign to manage the composition of Beijing's embattled atmosphere.

In dust storms, ecological degradation, meteorology, and politics stirred into novel configurations. In their movement, they charted out the geo-atmospheric footprint of a political meteorological zone of transspatial relation, anchored by a Beijing in the stream of the wind, vulnerable and exposed to environmental havoc in upwind places. Calls to 'protect Beijing' from the dust firmly reterritorialized Beijing in a cartography of China at the crisscrossing of airstreams and atmospheric exposures. Desertification, a process of land degradation that ravaged a full quarter of Chinese territory by official accounts, was recoded by dust-transporting air currents, into a root cause of the storms that would afflict more important places downwind. Upwind, vast tracts of desertifying China, especially in the inland and border regions of Gansu and Chinese Inner Mongolia, became "dust source areas" in the scientific and political weather-reporting of the capital. Downwind from Beijing, there were China's wary neighbors, choking on the ecological consequences of China's meteoric rise.

* * * * *

This dissertation is an exploration of the political meteorology of dust storms in China and downwind, since 2000. At its outset, it has two linked goals. First, it aims to track how environmental challenges in China are driving experiments in governing that raise important questions about anthropocentric conceptions of politics, both for the state and for the anthropologist. Grappling with the 'thing-power' of materials raises important questions, practically, for understanding the novelty of Chinese environmental politics and its genealogical relation and irreducibility to other moments in the contemporary biopolitical Chinese state. Second, it aims to model a form of multi-sited anthropological inquiry that is attuned to how the properties of environmental things like roving dust configure emergent zones of political possibility. In doing so, it aims to explore what might be involved in what Foucault and Massumi have discussed as a *becoming-environmental* of power, and whether the geological and atmospheric constituents of a dust storm might provide a political vocabulary that differs quite pointedly from the vitalisms of 'biopolitics' as a way of understanding human and environmental things in politics.

I suggest that the attempt of the Chinese state, at its national and local levels, is an important site for considering the ways in which 'environment' comes to matter as a powerful site for political experiments in ecology, science, and governing across China. Dust storms and desertification bring together a wide range of actors and concerns across the many spaces that they draw together. While population management conjures biopolitical Chinese state investments in its populace, the slipperiness of the earth offers a way of exploring a parallel modality of governing, oriented toward both the physical properties of the land and also toward a populace conceived itself as a physical structure in need of repair. While 'Chinese environment' has become an apparently oxymoronic shorthand for which the excesses, cynicisms, and hoped-for collapse of the contemporary political *status quo*, this dissertation suggests that contemporary Chinese state approaches to environment, especially the problems of desertification and dust storms, are indeed a site of governmental experimentation and assemblage.

Exploring desertification and dust storms with an attention to how the behaviors and qualities of materials in interaction is one way of tracking these environmental experiments in politics. The title of this dissertation is a way of locating inquiry in a space between two *States of*

the Wind, each of which is anchored by the powers of the atmosphere to drive changes in state. It is first the analytic problem and approach that 'political meteorology' aims to capture – how does the power of the atmosphere drive shifts in the state? These are part of a political ecology that is shaped by the power of the wind to drive physical shifts in state. In places susceptible to Aeolian desertification, the wind drives a sandblasting action of the landscape upon itself, wherein *terra firma* bursts into states of potential fluid motion. The earth gathers and moves as dunes, or enters into atmospheric suspension. Central to the political apparatus shaped by and against desertification is this capacity of the wind to phase earth into atmosphere.

Political Weather

A "political meteorology" aims at tracking convergences of politics, weather, and atmosphere. It operates as a general device for defining the space and contents of analysis. Meteorology, the science of the atmosphere, is a way not simply of pointing to air, but to the various powers and embroilments through which airs transform, contain, and relate disparate elements – social, terrestrial, environmental – in emergent atmospheric assemblages, out of which new political problems and new accounts of 'politics' are possible. Atmosphere, in this account, is thus a powerful technical, material, and political object, but also a mode of attunement to modes of relation and the ceaselessness of change. I take a cue from a voluminous reflection on the powers of air in Chinese thought. In Chinese classical medicine, to ponder winds (*feng*) "was to contemplate the mystery of change. This is the theme that runs throughout the history of the Chinese imagination of wind. Winds foreshadow change, cause change, exemplify change, are change" (Kuriyama 1994:24).

I use the term political meteorology to emphasize how politics and meteorology extend and grapple with one another to highlight how atmospheric phenomena and flow configure and drive new questions over the what and the how of politics. This is not simply a politics of meteorology, which might suggest that environments should be understood as a proxy for political relations between human groups. Instead, political meteorology indicates an ethnographic orientation that centers nonhuman presences, both to note the noncongruence of politics with human agency and to witness the extension of what counts as political in practice and encounter with elements in an expanded political fold.

Meteorology, the science of the atmosphere, and politics have long entertained an intimate relationship in China and beyond, even if airs and atmospheres have been difficult to theorize in political philosophy (Menely 2014, Choy 2011, 2012; for a notable exception, Sloterdijk 2009a, 2009b). From animistic sentiments over the powers of the air and weather to contemporary attempts to "cultivate the atmosphere" made chaotic and disturbing under climate change as a material-conceptual process (Hulme 2015), atmospheric processes and events have entered and shaped various political investments and strategies for managing a life in the air. In imperial China, anomalies in weather, positive or negative, like favorable rainfall or unseasonal drought, was the crux of a "moral meteorology" wherein atmospheric events – especially those in the capital – could be interpreted as divine appraisal of the conduct of the emperor (Elvin 1998).

Here, atmosphere, as a turbulent suspension, draws environments, peoples, and politics into new admixtures out of which new political and environmental forms may settle yet. Meteorology and atmosphere draw our attention not only to the materiality of air and space, but also to particular modes of relation. In a dust storm, earth is an atmospheric thing. A political

meteorology of contemporary urges new narrations of the relationships and futures of environments and politics. Accounts of grappling with environment and politics in China have often staged environmental degradation as a material limit not simply of China's ecology but indeed of its political system. Where the adventures of the market have not spelled the imminent demise of the Chinese Party-State, ecological degradation has become, gleefully, a site of political expectation in many accounts of the Chinese near-future. These accounts are haunted by their attempt to interpellate a Chinese political subject that is amenable to the analysis of 'civil society' for a democracy that is always yet to come. For instance, political scientist Andrew Mertha's account of 'water warriors' (2010) stages grassroots organization around water as an anticipatory site through which Chinese 'totalitarianism' finds its counterpoint in a quasi-teleological account of regime shift.

I argue that contemporary environmental politics in China cannot be understood as an extension of a Maoist "war against nature," in which both human and environmental natures were the objects of an agonistic socialist politics of mastery (Shapiro 2001). Nor can it be traced genetically from other ways of exploring politics as such in China, from analysis of environmental policy at the national or planetary scale. Rather, anti-dust programs in a China ravaged by desertification and its airborne consequences, are a site through which both political agencies and anthropological commentators are engaged in an ongoing re-evaluation and search for a way of apprehending a politics in which human things find themselves already in an environmental relation with other things. Where environmental challenges are truly challenges to politics, they have indeed driven experiments in environment and politics that might be indeed understood not as a negation of the modern Chinese state, but indeed as an extension of a flexible, adaptive governmental approach (Ong 2006, Heilmann and Perry 2011).

What counts as political in this regard must be tracked in its various forms, and as part of an ongoing process of displacement and experiment. If environmental problems present a challenge for the Chinese political system, a point that has been well-argued and well-documented in both academic and popular presses (Economy 2010, Watts 2010), maintaining attention to the various ways in which a supple state apparatus responds and reacts to these challenges might offer better insight into contemporary China than accounts that aim to anticipate and fit universalizing political problems onto a complex political process. The problem of land degradation that dust storms revealed downwind is both old and new. Indeed, for centuries, the earth and its qualities had been a problem for administrators and China's vast rural population (J.L. Buck 1930), dust storms revealed, far into China's peripheries and inland borderlands, a territory that was not merely unproductive but also perpetually displaced, demanding stabilization.

What this dissertation attempts to capture about contemporary Chinese politics is precisely the ways in which state practice grapples with and aims to adapt itself to shifting realities and problems, and, as always, the material qualities of the substances and relations at hand. As an apparatus of capture, 'politics' actualizes itself in new ways, fomenting novel topologies of power oriented toward 'environment' as both an object and technique of power. What anti-sand programs presage, in their remaking of governing on the ground (and just above its surface) in desertifying places, and in their reframing of administrative relations across space into Aeolian avenues, is precisely the reworking of social management into a technique of ecological construction. Paying close attention to the properties and interactions of materials and relations of elements in a shifting environment provides novel ways for understanding a form of

power oriented toward and reoriented by new environmental challenges, in China and places downwind.

At stake is the motion by which politics is continually displaced in its encounter with environmental things, just as encounters and juxtapositions drive a practical rethinking and remaking of worlds and analytic possibilities (Haraway 2009, Strathern 1990). Environment and meteorology are thus objects of power but also arrays of semiotic-material things that both interject into and disrupt political processes, as well as configuring new fields of political objects that will come to matter in governing. The maintenance and stabilization of a unified political order in China continually contends with a need to hold things steady that otherwise come apart – building stability in the earth, economy, and a startlingly shifty social order presage an infrastructural state, set with the task of fixing a liquid earth into place.

Powers of Environment

There exists a robust literature in anthropology, geography, and political ecology on environmental politics. These literatures have done the important work of, in various ways, of denaturalizing 'environment' and recovering it as political in various ways. Much of political ecology has aimed to show that environments must be situated in histories and power relations between human actors (West 2006, Escobar 2008, Peluso 1992), wherein what appears as 'natural' can be studied as cultural, and therefore political. Michael Watts characterizes political ecology as a set of transdisciplinary debates and inquiries that has been described powerfully as a mode of analysis attuned to "the complex relations between nature and society" (Watts 2000:257, quoted in Biersack 2006:24). Crucial to this work has been the interrogation of ideas of nature as themselves embedded in political practices, with important consequences for the naturalization and entrenchment of ongoing social difference. These works have often focused on grassroots and bottom-up movements, those governed rather than the political logics of those who govern. A more recent body of work, emerging from many corners of anthropology, geography, and feminist science studies – sometimes lumped together as 'new materialism' – has aimed to critique and develop ways of thinking politics beyond the individualist and anthropocentric assumptions of liberal political theory, pointing to the various ways in which nonhumans are consequential for a rethinking of political theory.

In conversation with political ecology which has largely asked how ecology becomes political and how the tools of social and political analysis can be used to interrogate environmental conflicts, I ask a related question. In China, how do ecology and environment enter and mutate what we understand as politics? How do environmental challenges and especially the powers of environmental materialities drive a practical reconsideration of governing? Such work aims to consider works in new materialisms that insist on the potency of materials and things in conversation with questions of governing. Such a framework aims to think environmental politics beyond a critique of modernist attempts to master nature by thinking about how environments conditions emergent formulations of politics. Thus rather than acquiesce to the cynicism that dismisses Chinese environmental efforts as an oxymoron in terms, I aim to explore how environmental challenges are driving indeed experiments in governing. Instead of arguing that environment problems in Chinese politics are a site for the extension of readymade political logics, or, worse, dismissing ongoing Chinese political efforts to resolve environmental challenges outright, my approach considers how environmental efforts on the Chinese state but also how they might provide the conceptual, empirical, and material openings

for emergent ways of thinking and doing politics and governing, both on the part of the anthropologist and of governmental experiments in the wild, as it were.

I also depart from classical political ecology by first trying to describe the Chinese Communist Party's idiosyncratic brand of sustainability and ecology, which, though it maintains dense connections to notions of environment that circulate globally, builds out of contingent conceptions of personhood, governing, and environment that bubble out of China's premodern and modern political history. In Chinese programs of ecological construction, the problematization of 'environment' as a material, political, and practical thing is both grounded in specific political histories and ontologies, while at the same time, remaining a site of possibilities. In the windy deserts and along the airstreams that this dissertation travels, social and environmental management would increasing become articulated as interrelated strategic techniques in an emerging 'environmental' approach to governing in desertified areas, what, following Foucault (2010) and Brian Massumi (2009), we could call a becoming-environmental of power. "Environment," in many iterations, entered into politics, not simply as an object but also as itself an array of consequential powers *and* as a figure through which political interventions and logic composed and were composed into a field of powers. This is true insofar as 'environment' references not only particular thing-power of matter, human and nonhuman, but also gestures at a more generally template of relationality, causality, and attention (Uexkull 2010).

In particular, I explore 'environment' and politics in two senses of the word environment. First, and consistently, it is in the recognition of the materiality and irreducibility of 'environmental' things and processes, like how roots hold sand or how scientists model how wind phases sand into motion. But more, as Lisa Hoffman reminds, that as in English, the Chinese *huanjing*, environment, is polysemic. It refers not only to things but also to how they are arranged in relation to possibility; environment is the set of "conditions that make something possible" (Hoffman 2009:107). 'Environment' is thus not a fixed object, but, as in classical Chinese traditions, an extensible and non-self-identical topos that refers to a space of possible meanings that inhere in the specific contexts of its deployment (Jullien 1995). An environment then is also a principle of relation between elements with their own qualities, some of which emerge precisely as an effect of their positioning in an environmental relation to other things, one that can be subject to rearrangement.

In particular, what is important about notions of environment as an arrangement of elements is that offers a way of decentering and then reconceiving agency as a property of humans, a move that is presaged in Latour's actor-network-theory's notion of actants (1987). In Francois Jullien's reading of Chinese military strategy, for instance, variables in the environment can be leveraged strategically for maximum effectiveness, such that a battle can be determined to be won before the first blows are exchanged. Strategy is not a matter of valor, but of setup, an art of arrangement in which the properties of elements in play can be elicited and directed for maximum effect. Components of this environmental arrangement – climatic, physical, geometric, human and otherwise – are possessed of *shi*, a propensity that Jullien translates as 'efficacy' or 'disposition.' It is "the kind of potential that originates *not in human initiative*, but instead results in the very dispositions of things" (1995:13, emphasis added). Where human initiative occurs is in the capacity to discern and maximize these dispositions – while at the same time, engaging with the human and other elements such a field of interventions and dispositions as interrelating things whose efficacies can be adjusted in relation to one another and in relation to final ends.

Weather, the slope of the land, the training and equipment of an army, all become variables to be arranged according to their specific and relational efficacies.

Jullien elaborates, through classical Chinese philosophical and strategy treatises, a conception of governing and statecraft that approaches social, ecological, and physical things as parts of a broader environment whose immanent and emergent characteristics can and must be subject to ongoing modification. The object of politics and of political analysis thus shifts from individual subjects to an environment, a field of relations and virtualities whose composition and arrangement can be modified toward the realization of desired ends. "Environment" in this sense emerges not as a natural outside to power but as precisely the network of elements in relation through which a new political 'game' is configured. Following Foucault, 'environment' in this sense draws our attention onto an action that "is brought to bear on the rules of the game rather than on the players" (2010:260), where action is directed at the arrangement and efficacy of environmental things rather than on the remaking of subjectivity, as has been a concern of much anthropological interest in the last decade. In a tantalizing footnote to his 1978-1979 lectures, *The Birth of Biopolitics*, he asks whether, in an environmental type of intervention, whether we are "dealing with natural subjects" (2010:261)? I suggest that thinking with environment in these two senses – as a shorthand for the consequentiality of nonhuman things, and for the powers and possibilities of arrangements and elements – offers ways of making a humanist political vocabulary strange to itself. Agency, for instance, in environmental perspective, is not rejected but indeed reframed, just as notions of subjectivity that are central to liberal political thought are reterritorialized in 'environments' that are also an emergent field of intervention for governing.

The challenge of 'environment' for anthropology, then, is to imagine a form of cultural analysis not couched in an implicit binary of the natural and the cultural. While thinking of environment as an anthropological object, how might we also think of environment as an anthropological method, a way of posing questions and interrogating relation? 'Marilyn Strathern, in *After Nature*, argues that as the limits of social constructionism, grounded in a binary of nature and culture, come to light, we are challenged to think of "what it might be like to belong to a culture whose next imaginative leap is to think of itself as having nothing to construct" (1992:9), where 'nature' and 'culture' are not figured in the temporal sequence of 'culture' building itself out of the raw material of 'nature.' One way in which students of the environment have addressed this problem is to point to the dense entanglements of elements that co-constitute human and nonhuman worlds (Ogden 2011, Tsing 2012) as a corrective to a solipsistic conception of a humanity traveling alone through the clean space of progress. In this dissertation, it is a challenge to consider the fate of 'political' analysis in relation to the presences, consequentialities, and multiple materializations of environmental things, like deserts that alternately appear as sheets of sand, or of wind-weak surfaces, or as dust source areas.

Bruno Latour famously argues that "modernity" asserts itself in the conceptual bifurcation of human and nonhuman things into non-overlapping domains. Where modernity hinges on this separation of nature and culture, human and more-than-human worlds, it fails in the fact that their ongoing relationship requires an ongoing labor of conceptual purification (1993). That "we have never been modern" is a cause for revelry, rather than regret, in that it draws attention to this Gordian knot of entanglements as precisely the grounds through which new figures of association can emerge. Noting this entanglement is then both to note the many ways in which human life and action are constituted through relations with many others, as well as with the insight that things have a "consequential materialism" (Kosek 2006:22). For Latour, this grants nonhumans the status of 'actants' in an actor-network of consequential elements. Jane

Bennett has recently made a claim to an attention to a shimmering 'thing-power' in which matter itself is consequential, not the least in its interruption of human worlds.

The attunement to entanglements of human and nonhuman worlds has been a key insight of many important works emerging in recent environmental anthropology, critical geography, and science and technology studies. While Latour focuses on *ad hoc* networks of elements in consequential relation, we might discern various figurations of environment, both as a collection of elements with their own thing-powers in interaction, and as a field conditioned through many forces and presences. Environmental history aims for a co-telling of human and other stories that "have been intertwined for millennia" (White 1995:ix). Hugh Raffles, in what he calls a 'natural history' of the Amazon, describes Amazonian nature neither as a pristine exteriority to the trespasses of human culture, nor as a space that is simply anthropocentric. Rather, these natures are "dynamic, and heterogeneous, formed again and again from presences that are cultural, historical, biological, geographical, political, physical, aesthetic, and social" (2002:7), a realization that has been crucial to the possibility of a "poststructural political ecology" (Escobar 1996).

As state and scientific actors in China understand this as well, the challenge becomes to trace how 'politics' operates amidst these other presences. Making sense of whether extra-human things can be accommodated in politics as existents (Stengers 2010) has been an important question as the interdisciplinary upsurge on multiple 'new materialisms' rolls on. Collections of consequential materialities and shifting fields of things in entangled relation challenge the anthropocentric and intrahuman consignment of politics to relations between humans or abstract historical forces. For while much focus has aimed to elucidate the multispecies and environmental situations through which human worlds both take form and become decentered, the question of how environment, in multiple figurations and materializations, not only becomes political (an object for power) but also irrupts politics itself is less clear. The remainder of this dissertation should be read as a set of anthropological experiments that track, conceptually and ethnographically, how politics contort and grapple with environmental things in the fourth decades of Reform in China.

Infrastructure and Exposure

This dissertation focuses on two entangled political problematics: infrastructure and exposure. In the years following 2000, where dust storms in the capital created the conditions for an empowered State Forestry Agency to remake the geo-social profile of vast tracts of upwind China, I argue that an emerging existential condition of environmental exposure in Beijing drove an ongoing reconception, practically, of much of northern China as a failing protective infrastructure for downwind environments. If exposure is a "contact between misplaced matter and flesh" (Mitman, Murphy, & Sellers 2004:13) Focusing on this couplet of infrastructure and exposure, I hope, emphasizes the unequal relations of places in the transspatial political-meteorological geography of anti-dust programs, as well as the deeply spatialized nature of these interventions. It is indeed that infrastructure and exposure can be understood, in spatio-relational terms, as reversals of one another. If meteorological exposure is the existential condition of relation to places upwind, a continuity of bodies and environments, atmospheres and landscapes across space, then infrastructure is, conceptually and materially, a way of neutralizing this relation. While exposure is a matter of existential insecurity through the environment,

infrastructure, as state strategy, is a way of fixing and separating relations in space, a practice aiming at realizing a cartographic-administrative fixity that has been disrupted, continuously, by the spatial transgression of land in motion.

Together, they comprise two opposite movements in the epochalization of the Chinese contemporary as an atmospheric condition. At stake are the air, its constituents and densities, and its powers to phase the earth into plumes. This is a power that, for Chinese scientists, administrators, and those most susceptible to encroachment by flowing sand, is a physical problem rather than a biological one. It is precisely that the earth is not alive – where Aeolian desertification has stripped the land of its protective vegetative cover – that it moves. In exploring programs for earthly and atmospheric control, I am particularly interested in thinking through geo- and Aeolian physics – two of the disciplines through which anti-sand work is channeled in China – to explore configurations of land, life, and labor that might provide an addendum to Foucauldian analyses of contemporary power in China that have focused on biopower, a "power over life" (Foucault 1990) that also presumes life as power. If, as geographer Yi-Fu Tuan describes the desert as an "absence that enables me to wipe out in one clean sweep sex, biological life, and death" (2001), thinking through a politics with desert winds demands a rethinking of the bio- in power.

The problem of life has been central not only to political philosophy, which has long described politics in terms of organisms, vital resistances, and upswellings of lively energy (Cheah 2003), but also in the analysis of Chinese politics as a control over the life, size, and quality of an overly and deficiently reproductive population (Anagnost 1997). Especially in matters of demographic and population management, a "power over life" (Foucault 1990) with its insistent focus on humanity as biologized and wrongly reproductive population (Greenhalgh 2008), or in recent reflections on classical Chinese figurations of vital energies, an insistence on vital agencies has been important in the anthropology of China. Additionally, environmental anthropology has for a long time staked its focus in landscapes and ecologies bursting with lively, vital energies. Rainforests, rivers, and living oceans populate environmental anthropological engagements with nature as a living, vital thing. In exploring sand, dust, and wind as political problems, I hope to gesture at a way of exploring a politics oriented toward the capacities of life's absence, where surface winds entrain and suspend land into change, and ultimately where political conceptions of human collectivity take forms quite different from the biological metaphors through which we are accustomed to thinking it. What is it to think of society not as a mass of living bodies, but as a "sheet of loose sand" whose particles shift, dissemble, or cohere (chapter 1).

Infrastructure and Topology

As anthropological interest in materiality and the operations of complex technical systems has mounted in recent years, studies and theorizations of infrastructure have become increasingly prominent in pushing anthropology beyond what has often been criticized as a focus on discourse and ideation at the expense of materiality. Especially in anthropological takes on large-scale engineering programs, infrastructure has been explored as a key constituent in contemporary politics.

There has been a flurry of interest in the social sciences on infrastructures. While a conventional notion of infrastructure thinks of at as systems of technological substrates (Star 1999), or the ways in which material, technical forms shape social forms (Collier 2004, 2011;

Anand 2011), Brian Larkin argues that "[i]nfrastructures are matter that enable the movement of other matter. Their peculiar ontology lies in the facts that they are things and also the relation between things" (2013:329). Infrastructure has been explored as an element in the spectacular politics of coloniality and technomodernity, as in Brian Larkin's description of the colonial sublime in British Nigeria (2008), or as the site of a politechnics in urban life, as in Nikhil Anand's description of the social and political constestations over water provision infrastructure in Mumbai's pipes (2012). Ashley Carse has written importantly on the engineering and expansion of the Panama Canal (2012), not simply as part of a global logistics infrastructure, but indeed as a structure whose engineering logic indeed subsumes 'nature' as part of its technical operation, at the expense of Panamanians who depend on fresh water that is funneled into the canal's locks.

In each of these studies, infrastructure' emerges both as the expression of a peculiarly modernist political logic while at the same time creating new possibilities for politics. In the reconception and then coming reconstruction of upwind China as a forestry zone, a heavily populated and quickly degrading stretch of diverse ecological zones is to be transformed through anti-sand and anti-wind infrastructures. These interventions aim to build geophysical structure into a shifty landscape so as to intervene in the conditions in which wind and sand coalesce into the mobile substance-relation blown sand, or *fengsha* (wind-sand). In these programs, more deeply, the land itself has shifted from the means of production typical of production-oriented socialism, into itself a failed infrastructure to be remediated. China's geobody is in these programs shifts from a cartographic artefact into the starting condition of an engineering project, to be resolved through engineering.

The land's qualities come into especial political problematization at the shifty earth's surface, and intervening in this earth-air interface, in and through forestry, approached as a nationwide infrastructure for controlling and intervening into downwind atmospheres. This political geometry, reconceiving the Chinese interior as surfaces, interfaces, and vectors of dust formation and motion, configures a peculiar political timespace organized. This governmental logic, oriented to geophysical stabilization as a means of 'protecting' airspaces has become key not only to Chinese central government investments in its vast mobile, sandy lands, but also to articulations of 'Asian' environmental solidarity beyond China's territory – and airspace – as China's downwind neighbors scramble to protect themselves from Chinese dust emissions. Problems of infrastructure have long been crucial to descriptions of the Chinese bureaucracy from dynastic times forward. Environmental historian Mark Elvin tracks how major water control programs were both crucial in first consolidating and centralizing the political authority necessary to maintaining complex hydrological engineering complexes, and then, in their fantastic upkeep, central also in overwhelming and eroding that authority. The Grand Canal, long silted, which linked Beijing and Hangzhou across thousands of miles, managed flows of water for primarily logistical, and not irrigational, purposes, especially to facilitate the movement of materials and tributes to Beijing.

Indeed, a focus on the large-scale management of environmental systems is central to classic, and much derided, Marxian writings on the Chinese state. Wittfogel's *Oriental Despotism* stands as one of the most controversial but also deeply entrenched engagement with the theory of the so-called Asiatic mode of production in Marx, which characterizes Asia through the world-historical deadlock of political despotism and socioeconomic stagnation. Wittfogel, in his engagement with these ideas, develops a conception of the Asiatic state that systemically links it with the sociotechnical demands of maintaining complex environmental infrastructures.

He writes that "it was the need for government-directed water works that according to Marx gave birth to the Asiatic state" (1957:374). He links the Chinese state, in its essential form, with the development of a technically adept managerial class that consolidated power through the control of large scale hydraulic infrastructures in the perpetually arid Chinese north. This state would be 'hydraulic,' in that the very essence of its operation would stem from the organizational and technical exigencies of managing large hydraulic technologies. For Wittfogel, "under the conditions of the Asiatic mode of production the agromanagerial bureaucracy constituted the ruling class" (1957:6). Wittfogel asserts that "A large quantity of water can be channeled and kept within bounds only by the use of mass labor; and this mass labor must be coordinated" and disciplined, demanding that people "work in cooperation with their fellows and subordinate themselves to a directing authority" (1957:18).

"The hydraulic state is a genuinely managerial state" (1957:49), adapted to and adept at quickly organizing large numbers of people to specific ends. In his conception, it is rigid in the sense that it must exist in a form constrained by the technical demands of water-system technologies, and yet it is supremely flexible as well, in that it can continually enlist and reorganize its populace for different ends. What is intriguing about the hydraulic state as Wittfogel presents it is that, he understands the reproduction of the Chinese ruling class not through cultural or ideological control, but by its technical necessity in maintaining a specific division of labor engendered by the exigencies of specific technologies and environmental conditions. The efficacy of this system is in the combination of technical and administrative expertise, suggesting a vision of the Chinese state that works fundamentally through the coordination of technology and society. The state is thus born, for Wittfogel, in relationship to complex technologies of social and environmental management, and elaborates and expands itself through the organization of a flexible population.

Despite this understandable rejection of Wittfogel's thesis for its relentless Orientalism as well as its environmental and technical determinism, there are certainly elements of his work that are striking. Where Chinese thinkers in the early modern period were to understand part of the failure of the Chinese empire in terms of its impractical and anti-technological stance, for Wittfogel the possibility of a political order in China is founded upon a practical engagement with the management of complex sociotechnical systems. It offers a general opening into a exploring how 'infrastructure' as political logic as well as material forms with their own peculiar technical demands, triangulate a relationship between a managerial state, the transformation and management of environmental conditions, and the management of a populace – conceived of technopolitically as a technical prerequisite for the management of an engineering system. Politics itself grows out of infrastructural demands and operates through the maintenance and operation of environments as large infrastructural systems, with populations existing as inputs. These ideas will be explored in chapter 2.

The hydraulic thesis offers openings into a much deeper and longer relationship between power and environmental management. It raises an important question about how infrastructures and social management might operate in an 'environmental' assemblage of power, where, politically, human populations are to be coordinated as elements of a broader system that does not make a deep *a priori* nature-culture split. In this shift, government approaches to rural regions shift from biopolitical assessments of a rural populace of problematically poor human 'quality' (Anagnost 2004) to parts of an engineering project that might be harmonized into the workings of an optimized ecological system. In the attempt to control blown sand through massive infrastructural intervention into Inner Mongolia and other upwind sites, there are other

possibilities for conceiving the populace that run alongside biopolitical investments in a living population (see chapter 1).

What Wittfogel offers is an opening into a situated history of infrastructure as not simply a governmental problem, but part of a longer formation of the political that closely links the Chinese state, the management of social and environmental things, and complex infrastructural and engineering endeavors. Rather than considering the 'hydraulic civilization' that Wittfogel describes as an essential cultural form or pre-ordained historical stage in a universal process of social evolution, it is helpful to think of it as the description of a peculiar topology of power, organized in relation to the particular qualities and exigencies of water. Steven Collier, in his reading of Foucault's later works, describes a topological approach to the analysis of political government. Such an approach focuses on how "heterogeneous elements – techniques, material forms, institutional structures, and technologies of power – are configured, as well the 'redeployments' and 'recombinations' through which these patterns are transformed" (2009:80). Thus, rather than searching for political logics immanent in Chinese culture, for instance, or suggesting a material determinism where water itself guarantees the political forms proper to its control, a topological approach allows us to see how environmental materialities, infrastructural and technical demands, institutional and political techniques come together to form a shifting and experimental political assemblage.

Here I suggest that infrastructures, as technical, political, and material things, both emerge in particular topologies of power, just as their material and technical dimensions play a key role in the ongoing reconfiguration of these topologies. Such an approach for considering the multi-faceted infrastructural and managerial approaches to anti-sand forestry highlights the particular materialities of sand and wind, while also allowing for a multiplicity in the understanding of desertification or sand control as a political problem. Where for Wittfogel, waterworks all but guarantee an autocratic managerial state apparatus of a fixed form, the ways in which dusts matter and come to matter for an authoritarian state apparatus are linked to the various ways in which they are enacted as a multiple object (Mol 2002). They depend on the various ways in which it emerges as a scientific, political, and semiotic-material thing.

As grasslands collapse into deserts and dust source across China's Inner Asian Frontiers, long a contact zone and site of cultural and political experiment at the fringes of China Proper (Lattimore 1940), state infrastructural programs have proliferated in relation to quite different enactments of the materiality of earth in potential motion. The notions of land, human and nonhuman agency, and space-time that appear in these programs both inform and emerge out of specific political configurations of deserts as a problem to be resolved. If the technical management of water necessitated the formation and managerial format of a 'hydraulic civilization,' the particular infrastructural and political investments in controlling the flow of wind and sand have been indeed seen the proliferation of techniques for social and environmental construction, each of which is addressed to a different materialization of the dust problem, and yet are nonetheless coordinated as prongs in a centrally-managed but locally implemented campaign against sands. The "specificity of the case and the micropolitics of materials" (Barry 2010:90) at hand matter.

Zonings: Chapter Outline

This dissertation explores in different turns sets of political investments in the mobilities of sand and wind in interaction, and how, in various political programs they centered related but distinguishable micro-topologies of environmentalized power. Each chapter centers on experiments in governing and material knowledge, and for my part, operates as an analytic experiment in capturing a relationship between political practice and a particular materialization of windborne sand, whether as flowing material, configuration in ecological time, or as a globetrotting event.

The dissertation's inspiration began in 2007, when I was a project manager at the first state-registered foreign NGO in China, deeply involved in anti-desertification afforestation efforts in Inner Mongolia. Subsequent trips to China for preliminary fieldwork and language training took place the summers of 2009 through 2011, and the bulk of formal dissertation research was based on 14 months of field research across China and South Korea from the summer of 2011 to the fall of 2012. Research is based on dozens of hours of interviews with NGO workers, scientists and ecological engineers, local bureaucrats and forestry bureaucrats of different ranks, as well as participant observation with foresters and ex-herders in an Inner Mongolian forestry zone in Alxa, and with desertification scientists at two field stations and the central desert research institute of the Chinese Academy of Sciences.

Here, my fieldsites are several, but my field is one: the projected path of a dust storm. Along this path, the convergence of sands exposed by desertification and the beds of seasonal airflows, many geographies grapple with one another. In the design of the research and in the structure of its argumentation, the dissertation aims to replicate and capture the sense of motion, virtual and actual, in which dust storms and those who they draw together live. Tracing out a field across many sites is to sketch the footprint of an emergent and recurring meteorological and environmental complex problem, it is an emergent 'zone' of environmental intervention and ecological construction, it is an excessive space where the earth refuses to stay within the tight boundaries proscribed to it by a landlocked state of mind. It is a region of scientific and engineering interest, resonance, and example. Where Aihwa Ong writes of 'zonings' as an administrative practice of spatial demarcation in East Asia (2006), here it is indeed that determining a space of research and intervention was a zoning practice that I engaged in alongside the State Forestry Administration, the scientists migrating between deserts field stations, and with ex-herders deciding to move to cities or resettlement villages or ultimately to stay in place.

To call these paths of suspended earth a 'field,' is to come face to face with how "the 'where' of anthropology" (Gupta and Ferguson 1997:2) is bound to a peculiar ontology of place, how emplacedness works as a disciplinary condition. Where the problem of 'the field' as a bedrock of the anthropological way of knowing has been challenged by the fact of a "globalized, deterritorialized world" (Appadurai 1991:196, in Gupta and Ferguson 1997:3), here, the field is rendered strange less by deterritorialization than by deterrestrialization, processes by which land becomes its others. It is not that any here has been dispersed into a deterritorialized elsewhere, as Appadurai suggests, but rather, how the here phases into mobility, how it is already a potential elsewhere – it is not a matter of a unity splitting apart, but rather something that can be grasped suddenly and especially by its mobility. We might notice how a classical rendering of the field demands not only the fixity of place but the fixity of space and its earth substance, and that 'multi-sited ethnography' demands on the conceptual and material possibility of distinguishing fixed moments in place.

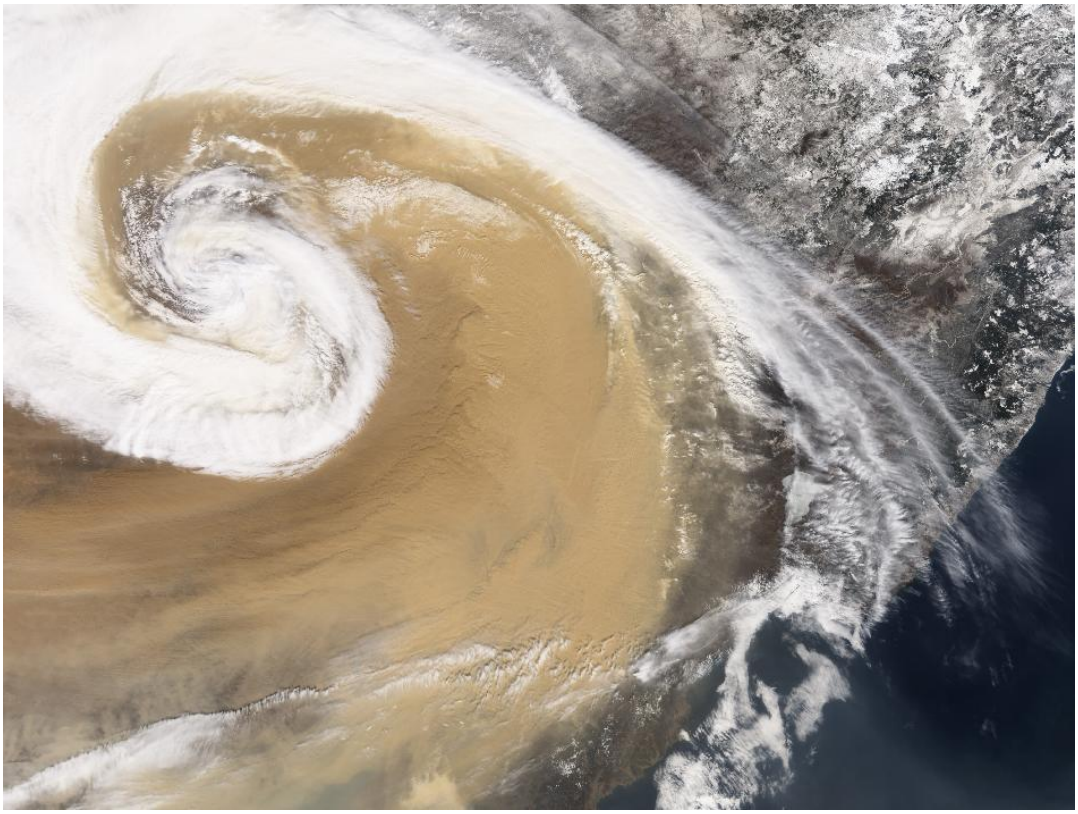

Figure 1: Asian Dust Event of 2001, NASA satellite image. A dust storm, in snapshot, both obscures and also doubles the terrain below with its intermittent and protean topography of visible ridges and valleys.

A dust storm is the phasing of the earth into a constituent in the atmosphere. From space, in the technological stillness of a satellite snapshot, a dust storm appears as a continent complete with topographies of intermittent ridges and valleys. It is a fleeting deterrestrialized continent, making airflow visible, and visible in one of its entireties only in the satellite's impossible eye. To think with this technically mediated god's eye view from above is not to discern a "disembodied scientific objectivity" (Haraway 1988:576) far from the confounding sands that swirl at one's feet. Rather, we ask what it is to be situated in an earth that has become a speed, "as if every part of the mineral world could be defined by specifying […] its speed of flow: very slow for rocks, faster for lava" (de Landa 1995), even faster for dusts entrained into air. If the political contortions and topologies I describe might be interpreted as responses to this question, it is also a question for an anthropology attuned to the earth and its atmospheric envelope. Marshall Berman quotes Rousseau in describing the quintessential experience of modernity: how is one "to move and live in the whirlwind" (Berman 1983), *le tourbillon social* of an unsettled history? How do we then envision an anthropology exposed not only to the winds of history, but also actual winds?

It will not do to be situated, if that means enclosed by human embodiment and scale, self-disclosing and accountable to a designated position, but rather, situated, to be available for suspension like dust in the wind, even while replicating their motion. For me, gaining an understanding of the posing of dust storms as a transspatial problem emerged both through 'situated' work on the ground, and talking with scientists, engineers, and cadres as they referred to satellite images pulled from NASA and Google Earth, a god's-eye view for situating a problem that limned many localities in contemporary China. For to be situated in the wind may

be like being a mote of dust in a storm, floating across hemispheres, or like a windbreak poplar, holding against the wind only to catch its shape, or like a desertification field scientist, moving from one site to the next to collect dirt for a wind tunnel. To be situated would be distributed, dilute. Imagine, then, to be situated with the wind, Aeolian, one traveler suspended and settled amongst others.

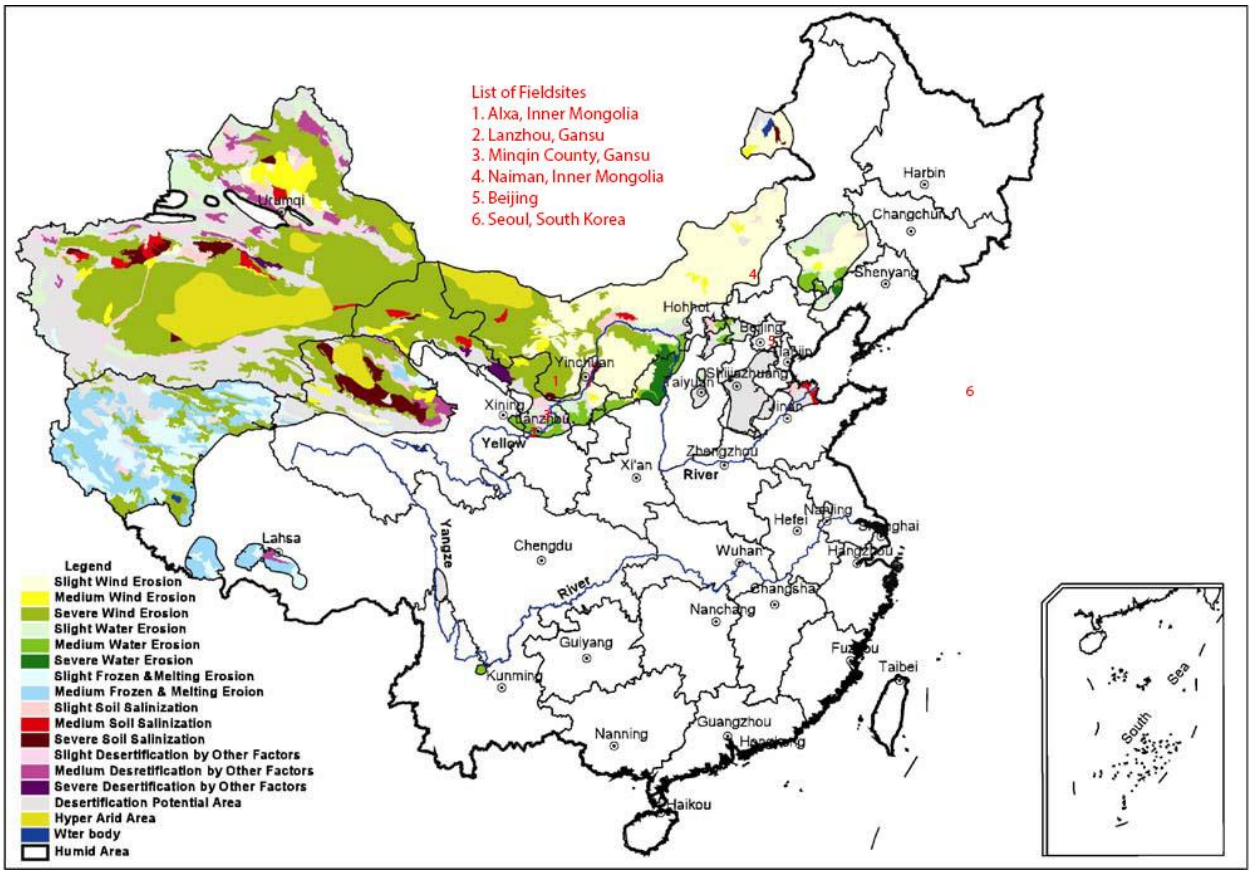

Figure 2: Fieldsites mapped onto a map of desertification in China (Yang et al. 2005).

In this regard, the dissertation is separated into three main sections that correspond thematically and empirically to the different ways in which various regions of the wind are drawn into the infrastructural practices and atmospheric conditionings of the Chinese Communist Party's sand-control forestry complex. As relative positionings, each point in the wind is meant to evoke the others as heterogeneous places in a holistic but supple experimental topology and topography of power unfurling with the movement of a storm. Where 'exposure' appears as a downwind political meteorological affect in a Beijing and a Seoul shocked by airborne dust, for instance, infrastructural and forestry programs in upwind Inner Mongolia and Gansu provinces can only be understood in relation to this transspatial political imaginary, of which the there-ness of a desertified place has to do with its geographical relationship to more important downwind places.

In the first section, *Upwind*, different social-technical-infrastructural political topologies emerge in relation to various scalings and enactments of the problematic properties of sand and wind. In Chapter 1, "Sheets of Loose Sand," we explore how the scientific modeling of blown sand – sand entrained or suspended in wind – offers a way to consider a political logic of

stabilization and infrastructure that limns state desires for both territorial and social stabilization. For instance, where dust storms are modeled scientifically as the massively upscaled – and impressively fractal – manifestation of a microphysical relationship between grains of sand in flowing air, the political control of desert motion frames the topographical control of deserts in relationship to the problematic interface of sand and wind. Such understandings of desertified environments as places of blown sand formation organizes a set of specific infrastructural investments in the earth at its vulnerable surface. Thinking with blown sand politically inaugurates a conception of desertified land as being perpetually subject to the possibility of its fluid motion. It indicates territory for which the fixities of *terra firma* must be thought of an intermittent condition of rest between moments of movement

I suggest that thinking with sand susceptible to wind opens an unexpected way of considering 'stabilization' more generally as a political logic. In the political thought of Sun Yat-Sen, the man conventionally recognized as the Nation's Father (*Guofu*) and founder of the Republic of China, the state of Chinese society is often likened to a "sheet of loose sand" whose structural properties must be stabilized by the new state, as with the addition of cement. Topographical and social stabilization – threaded scientifically and metaphorically through the resistance of sand to structure – offers a way of thinking modern Chinese politics, in its orientation both to territory and society, as a reckoning with geo-sociological quantities prone to dissolution without the constant vigilance and intervention of a modern state. Infrastructural programs, I suggest, are unexpectedly poignant in relation to the ongoing demand to social stabilization through which Reform-era policies and tactics of social management are mobilized as means of stabilizing a fundamentally unstable field of political objects.

In Chapter 2, "Groundwork," we explore how forestry programs elaborate new topological relations between social management, economic development, and ecological construction, particularly through the symbiotic entanglement of two roots. Where blown sand engineering constitutes the earth's surface as an interface with the atmosphere that must be infrastructuralized, in forestry planning and programs in Alxa, this surface is understood as a geophysical structure that must be managed through new 'environmental' programs. Through the adjustment of the economic behaviors of people in desertified areas– behaviors themselves reframed as machines of geostructural disruption or repair – the state-led promotion of new economic and policy conditions emerges as a technique for the state management of economic life as an ecological technique. What I call 'groundwork' indicates a peculiar configuration of forestry, economic development, and the conception of markets as environments into a topology of socio-environmental powers, aimed again at build infrastructure into the earth's surface. Roots, markets, incentives, and kinship are enrolled into parts of a shifting governmental ecology focused on building infrastructure in the form of windbreak forests. This is a governmental logic homed on generating geophysical stability while maintaining social stability through the promise of economic development.

In Section II, *Mid-Stream*, we consider more deeply the ways in which particular material enactments of sand and wind as mobile and fluid substances reorganize spatiotemporal and embodied affects across the path of dust storms. Ultimately, the suspensability of tiny particulate granules of dust is the root physical condition for atmospheric and meteorological admixtures and events in different sites and scales. 'Dust source areas' are a retroactive and anticipatory tracing of an environmental threat and the establishment of a meteorological relationship between distant lands. Downwind, desertification manifests as suspended particulate matter, gathering and fomenting emergent political problems and possibilities in its movement.

In Chapter 3, Slow Futures, I explore how political and scientific engagements with sands engender multiple entangled ways for envisioning political and environmental futures in sandy places. I contrast grand narratives of a universal humanity's entry into a new, anthropogenic geological stage, the Anthropocene, with two modalities of time, traced ethnographically through dunes and their changes in China. First, I suggest that in places where sand is encroaching at a rate fast enough to register but slow enough that it will take years to fully render habitation impossible, life is suffused with the affect of waiting for a slow disaster. A protective architecture of sand barriers, blockades, and walls makes political sense precisely as an action against the space-times of sand. In contrast, I explore how restoration ecologists read processes of ecological succession on dunes as a way of constantly reactivating and recuperating ecological time as definitionally progressive, so that even denuded dunes can be seen as ecological recovery sites in process.

The mobility of dusts on the wind has made dust storms a harbinger of the dusty Asian springtime in China and far beyond, as storms trace out regional and then hemispheric atmospheric connections. Dust storms, as a meteorological phenomenon, find their political importance insofar as they are transforming the texture of everyday urban life, literally clouding the promises of China's great urban transformation for a burgeoning and media-savvy Chinese middle class increasingly vocal over urban environmental issues (Zhang 2010, Hsing 2012). That particulates from deserts can densify the already famously thick air of Chinese cities seeds new urban affects and embodiments for breathers exposed to atmospheric danger.

In Chapter 4, Particulate Exposures, we return to the problems of meteorological exposure that animate infrastructural projects far upwind, especially by attention to the changed nature of breathing as a form of political embodiment in Beijing and beyond. As particulates suspend in urban air it also doubles urban life into a condition of exposure, through which new ways of engaging with the state might be articulated. In Beijing, exposure begets new ways of thinking the city in a national and literal infrastructure, as urban weather and pollution drive central demands to hold upwind earth to the ground. As all that is solid stays in the air, the city is increasingly figured as a great atmospheric interior to be protected from its outside, just as the city is increasingly remade as a great architecture of nested interiors, insulated from outer airs and their contents.

Exposure is a relationship of contact between bodies and materials out of place. It indicates embodiment as an environmental condition and the various ways in which human life and debility are knotted through atmospheres. In zoning dust storm geographies, it is precisely in the dense atmosphere of powerful cities that matter most. The dusts that peel off the surface of distant dunes in days also hang and settle in urban basins and lungs. In such an aerosol condition, breathing becomes an ironic and debilitating mode of urban belonging. Possible atmospheric subjectivities abound, couched in idioms of susceptibility to air. The urban populace emerges, in public discourse, as a motley assemblage of filters and vacuum mechanisms, presaging new visions of collectivity in machinic chimeras of flesh and aerosols. These gesture at a distinctive middle-class populace whose form of people engagement with the state neither replicate the civil society mobilizations that western pundits hope for, nor revivify 'the specter of the People' (Cho 2013) in a flush of socialist reanimation.

In the final section, *Downwind*, we trace the dusts beyond China's borders to South Korea where they pass through Seoul *hwangsa*, yellow dust, heavy with pollutants gathered as they travel over the Chinese continent. A small community of NGOs, since the late 1990s and early 2000s, have arisen, in the name of post-normalization Chinese-Korean friendship, to plant

trees in Inner Mongolia on the Chinese mainland. In the walls of trees, each designed as a living barrier to sever the winds that will eventually reach Korea, these groups articulate new visions of Asia as a space of shared meteorological fate and distributed blame. What politics of friendship (Derrida 2005) is implied in the existence of these walls, and what Asia can emerge out of the dust?

Chapter 1: Heaps of Loose Sand: Geo-Sociologies of Blown Sand

Surface to Air

As late fall settles into the long quiet of winter and color drains from the scrubby grasses, a cold wind blows across the land, lifting up peals of yellow dust from the sand drifts that have blown in from over the horizon. The wind blows here, as locals joke, just once a year, "from the first day to the last." Its force is registered in the way it shapes and reshapes the exposed sands of the rapidly desertifying landscape of this sparsely populated corner of western Inner Mongolia Autonomous Region[1]. This wind drives aeolian desertification, a form of land degradation through which vegetations are depleted by abrasion under a scraping, erosive wind. On the wind, the exposed earth is rendered as a potent, geo-atmospheric fluid as sands and dusts combine into a third substance called blown sand, in Chinese simply *fengsha*, a 'wind-sand' that indicates the blurring of the surface of the earth into a fluid interface of windy and earthy things. As air and earth interact, the topography of the Alxa Plateau, this westernmost region of Chinese Inner Mongolia has been remade in the manner of a ventifact, a wind-made geological thing[2].

Alxa extends beyond a last frontier outpost of the Great Wall, marking the historic and contested line between China Proper and its Inner Asian frontiers (Lattimore 1940) far past the leading edges of two expanding deserts, the yellow of the Tengger and the characteristic ruddy sand of the Badain Jaran, each of which is visible as a dry slash on the horizon from the promontory point overlooking the administrative center of Bayanhot, a tiny city of 100,000. While blown sand threatens the city and is decimating the pastoral economy in the degrading environmental buffer between city and desert, what has attracted national and regional attention to Alxa is its status as a "blown sand source area (*fengsha yuandi*) on the northwest route of massive globetrotting dust storms that, in days, pummel Beijing and move beyond to the Koreas, Japan, and eventually the United States, in what is visible from satellite as a floating continent of airborne earth, wind-sand. Wind and loose sand thus link the sandy ground here with farflung skies through the world-binding connections of atmosphere. 600 miles from Beijing, without direct connections by air or passenger rail, Bayanhot, poised against its own engulfment in sand, has become, in the words of the Banner's Party Secretary, an unlikely and yet obvious "front line in the country's battle against desertification." And in this battle, combat is fixed against the dangerous capacity of loose sands to move as fluids and suspensions in the wind.

Since 2000, the Alxa Plateau has become nationally infamous as a "Cradle of Dust Storms," drawing massive scientific, political, and technical investment, especially through the Chinese State Forestry Administration, aimed at holding the land in place. Controlling sand – making it stable against the wind – has emerged as a way of halting the desert's spread, which in the words of prefectural Deputy Secretary Zhang, "is a direct threat to survival in Bayanhot. Therefore,

[1] Inner Mongolia, *Nei Mongol*, officially, is an autonomous region (province) that borders today's Republic of Mongolia – historically, 'Outer Mongolia,' when these regions were part of the Qing Dynasty. Inner Mongolia is a territory of the People's Republic of China.

[2] Ventifacts, for geologists, are "rocks abraded by windborne particles" (Bridges et al. 1999:8,595), wind-worn rocks. The term is provocative in that it exhorts us to remember that geology, a study of the earth, is also an attention to relations through which stones and winds incite each others' relational capacities. But more immediately, ventifactuality, from *ventus*-, wind, and *factus*, have made, is a challenge to consider productions of an extrahuman variety, to think of winds as making; a curious semantic disjuncture is opened in the term, where abrasion, wearing, and erosion are considered forms of making.

'blocking the wind, holding the sand' (*fangfeng gusha*) and combating desertification are paramount tasks, more important than economic development because if the sand buries the city, all the money in the world won't matter." This phrase, "block wind, hold sand" is a forestry slogan that succinctly defines desertification and the techniques for addressing it as a matter of the control of aeolian processes, that aligns governance in desertifying places with a physical intervention into the conditions and elements through which blown sand activates, and in which the fixities of a stony geology become a sandy matter of fluid dynamics. It is a politics fixated on materials in relation, aiming to condition and intervene in the processes by which sandy earth becomes dusty wind.

Where the earth has become a virtual fluid, the stable bedrock of land becomes an ironic end of politics rather than its starting spatial condition. Territory and land are thus not simply the inert spatial prerequisites of politics. They are also earthy substances whose properties come to matter politically in many unexpected ways. If we understand "block wind, hold sand" as a refocusing of political attention at the interaction and problematic relation between terrestrial and atmospheric substances, it is also an invitation to think how the "the materiality of [blown sand] itself is critical to its political formations" (Anand 2011: 544).

In this chapter I explore, following Deputy Secretary Zhang's invocation of 'block wind, hold sand,' the ways in which politics and geological processes condition each other through an exploration of sand stabilization techniques addressed to arresting the formation and flow of blown sand in Alxa. How sand and its windy phases emerge as scientific, technical, and political concerns is central in exploring the specific rationales that drive anti-desertification politics in China. Sand and its properties matter politically in a number of ways, not least in the recurrent realignment of political practices to the geophysical qualities of flowing sands. But additionally, this attention to the shifty, anti-structural properties of sand is part of a much longer history of social and political thought in modern China, a geophysical conception of the population as a physical and geological quantity as well as a mass of vital qualities.

In the control of sand's susceptibility to wind, geophysical stabilization emerges at the center of programs of topographical control as a way of making the earth solid again, impervious to the wind. In the articulation of dust storm control as a political matter, intervening in the relationship between sand and wind is a matter of scientific knowledge and of governmental urgency. Demands for stabilization and the emergent understanding of the innate instabilities of a range of political objects – sand in wind, but also, as we shall see, society itself – provide the anchors a political topology oriented toward shifty geo-sociological things. For Zhang, the forestry officials, and the desertification scientists and engineers charged with combating desertification by holding its effects firmly in place, the issue of desertification emerges out of scientific-political problematization as a problem of the physical structuration of loosened sands, stabilized against their own startling non-fixity. The politics and techniques of combating desertification, which might otherwise be conceived of as a process of ecological degradation, were inextricably bound to the experimental elaboration of a governmental apparatus of geomorphological stabilization now aimed blocking wind and holding loose sand.

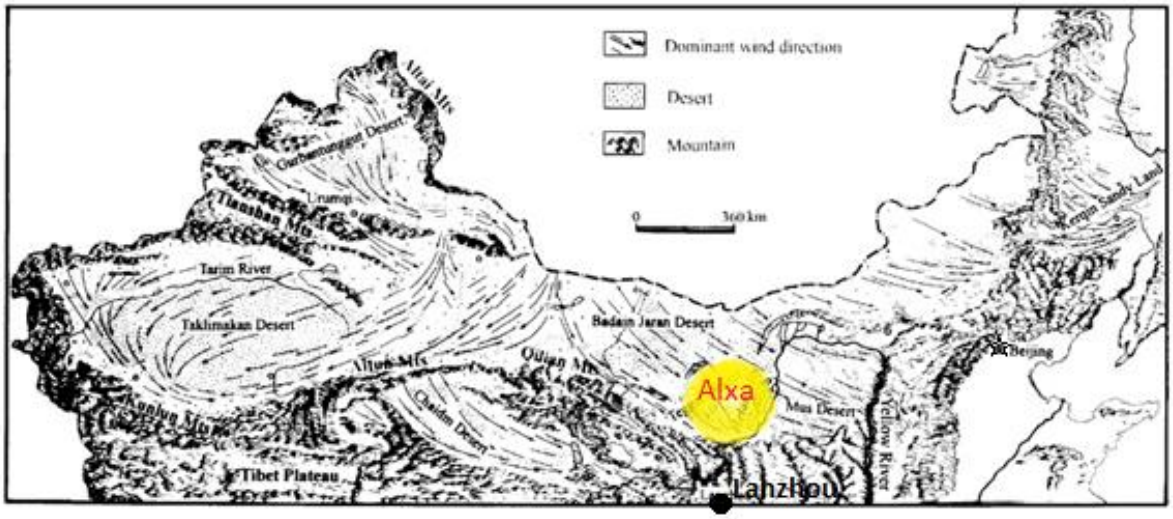

Fig. 2. Dust-transporting wind systems near the ground surface in China. The figure is revised and supplemented following Zhu et al. (1980).

Figure 3: Alxa. This map, drawn from a scientific paper on desertification engineering depicts northern China as a self-contained space defined by wind systems that skim the surface while also cutting across space. Deserts are indicated, as well as mountain ranges that here, are channels for winds that pass over deserts. Alxa's popular status as a 'cradle of dust storms' is indicated by the arrows that point toward Beijing.

This chapter proceeds, elaborating a political and material analysis through the development of two intertwined concepts: stabilization and infrastructure. I argue that stabilization and infrastructure, in their Chinese formation, offer a way of thinking a form of governmental thought and practice that does not immediately distinguish between 'natural' and 'social' things. Rather, they attend to a world of political things that are taken to be definitionally shifty and tending to dissolution, whether it be the chaotic spray of a dune in the wind or a rural populace threatening to fall into disorder. They draw our attention to problematics of structuration, ordering and disorder, in which sand and society begin to resonate with one another as political objects that seem to demand stabilization through constant governmental action. Antisocial sand and a sandy sociology draw our attention to the interfaces of geology and sociology.

The chapter outline is as follows. First, I develop a reading of a key thread in modern Chinese political thought haunted by images of geological disarray, especially 'father of the nation' Sun Yat-Sen's famous claim in 1924, in the rubble of the Chinese empire and the non-start of modern nationalism, that China and its populace are a "sheet of loose sand." This writing opens a genealogy of stabilization as a recurring motif in modern Chinese political rationalities, wherein state practice is oriented toward a world of social and nonhuman things always on the brink of falling apart. I then zoom in on experiments in the indoor wind tunnel at the central Chinese Academy of Sciences institution for desert environmental research in Lanzhou in nearby Gansu Province. I end by describing specific engineering techniques and aspirations through which desertified lands are to be made into a national infrastructure against winds and sands.

Before Life: Powers of Earth

Political geology, like political ecology, is an attunement, or an "art of noticing" (Tsing 2011:6), more than it is a definite method. Following philosopher Elizabeth Grosz, a political geology demands a noticing of the "forces of the earth," which penetrates and props human bodies and societies, "forces beyond the control of life that extend beyond life itself" (Grosz 2008:23). This 'beyond life itself' matters in as an incitement to pursue an approach to environmental thought that holds the identification of 'environment' (and politics) with vital, living forces as an achievement rather than a 'natural' given. It means an attention to how blown sand acts and how its properties become materially, epistemically, and politically active, taking a part in defining the terms in which it becomes a governmental problem. Scientific, technical, and governmental practices home in on certain qualities of blown sand, especially as the embodiment of a form of geological motion, animated by "physical activities."

Chinese aeolian physicist, Dong Zhibao, in his history of the Chinese aeolian physics research and engineering establishment notes that for researchers in China, "[d]esertification's primary feature is the activity of blown sand, and blown sand is the primary attribute of a variety of aeolian landscapes and landforms. Therefore desertification is first expressed as a problem of blown sand" (Dong 2005:293). In this account, desertification and its release of sand into potential blown sand is apprehended as a physical destructuration of a landscape into a mineral chaos; desertification is presented not merely as a change in the composition of an environment, but as a process through which stability becomes instability, and the autopoeisis of ecological systems collapses into geophysical chaos. Desertification is a process of physical destabilization. Desertified places are constituted their geological properties, shaped by the earth-sculpting forces of wind and sand rather than the fecundity of life. Desertification and its control are wrought as matters of geophysical process rather than life itself.

Considering such telluric forces might push environmental anthropology beyond its *de facto* investments in life and biology as default sites for discovering nonhuman 'agency.' Literary theorist Jeffrey Jerome Cohen describes the identification of environments with a lush and vital nature as a chromatic impediment to a fuller understanding of environments, a lingering attachment to an Edenic and impossible natural ideal. "Green dominates our thinking about ecology like no other," he writes, "as if the color were the only organic hue, a blazon for nature itself" (2013:xix). Much of environmental anthropology inadvertently replicates this elision of ecology with the vigor and activity of life, and then discovering in life itself with a surprisingly conventional humanist version of nonhuman agency. Biomes heaving with ebullient life have featured prominently in the environmental anthropology of last two decade, whether in rainforests emerging as a collaboration or contest between humans and other living things (Raffles 2002, Tsing 2004) or zoonotic zones exploding with hyper-proliferative viral life (Lowe 2010) or in the mycological and microbial networks that make human life a 'multi-species relationship' (Choy et al. 2009). Such a cluster of approaches has made environmental anthropology a lively engine for the vital interjection of living others in their entanglements (Ogden 2011) with human life.

If as geologist Michael Welland puts it, the desert is a "stage on which wind and sand are actors and dancers" (2009:147), other visions of environment and its politics might be gleaned in this geophysical choreography. Desertification and blown sand conjure figures of environment devoid of life and smothering of livelihood, offers an opening for an environmental anthropology

that considers 'nature' beyond its elision with vitalities, and then the nonhuman beyond the forces of living.

Geophysical processes that powerfully shape and reshape the earth are an invitation to consider a form of environmental thought that hesitates over the limitations of the prefix *bio.* The study of aeolian processes and the windy geology of blown sand can be understood as one way of exploring a material animacy that is not a 'liveliness' *per se* (cf Chen 2012), but rather forces of change and process that are continuous with the earth itself, classical conception of geology as an ur-science of extrahuman process, and perhaps now, in announcements of human impacts on earth systems, a science of geo-bio-social (Bonta and Protevi 2004) entanglements.

The timeliness of geology today - an increasing sense of present modes of human existence in geological terms, which Ellsworth and Kruse designate a "geologic now" (2012) - is an important site for anthropological intervention as well as an intervention into anthropological thought. Such a conception of a geological rather than biospheric Earth is apt to deserts, where the interplay of wind and sand, in their most idealized scientific form, makes them scientifically analogical to extraterrestrial environments: Aeolian physics, the science of sands and winds in interaction, finds its most immediate contemporary applications in modeling the motions and forms of desert and desertified landscapes, first, and the surfaces of Mars, Titan, and Mercury, shaped and reshaped by powerful winds. That is, where a dawning environmentalist consciousness in the early 21st century supplements 'humanity' as a geological as well as ecological planetary agent, where, we are told, "[h]umans now wield a geological force" (Chakrabarty 2008:206), impacting the nature of nature like a world-shattering meteor, what possibilities for the human sciences hang in this "mineralization of humanity" (De Landa 1997:30)?

In what follows, thinking with geology is an opening to a meditation on the conditions of and alternatives to contemporary investments in 'biopolitics' and its various visions of life, population, and flourishing. Michel Foucault's famous account of biopolitics has been read as the ongoing governmental in human collectivity as a racialized and biologized 'population,' (1978, 2003). As a political geological supplement to this political identification of human sociality with the powers of life, I explore a famous political trope in early modern Chinese political thought, canonized in the writings of 'Father of the Nation,' Sun Yat-Sen[3], that makes Chinese social form politically visible not as a matter of its vital agency but rather of its geophysical failure - a China crumbling with the instability of sand.

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A Heap of Loose Sand: A Political Geology (1924)

In 1924, in the rubble of the Chinese empire, Sun Yat-Sen, canonized in Chinese historiography[4] as the empire-toppling father of the nation and the Chinese Republic, famously

[3] Recent attempts have been made in China to reinterpret Sun's writings as a Chinese political philosophy that is both indigenous and modern, the elaboration of a particularly 'Chinese' national vision through which new political possibilities for China might be developed. The most famous contemporary reader of Sun is Chinese literary critic Wang Hui, whose project of interpreting a modern Chinese political text as part of a complex and intensely consequential 'Chinese' negotiation with received western political philosophy inspires this section.

[4] This canonization has occurred on both side of the Taiwan Strait, owing to the remarkable ways in which each government has anointed itself as a proper successor to Sun's Republican China. In the People's Republic of China,

(Bergere and Lloyd 1998) claimed that a Chinese Revolution could not proceed as an attempt to replicate European revolutions. Indeed, Sun lamented, for a Chinese Revolution, the aims must be "just opposite to the aims of the revolutions of Europe." If European revolutions sought to overthrow a historical condition of despotism by proclaiming 'liberty' as a political end, China's problem is, for Sun, quite the opposite, owing to the specific character of Chinese social forms, their almost constitutional resistance to the organizational forms required of a modernized politicum. While, for Sun, European revolutions responded to a lack of liberty, in Sun's China, it is a *surfeit* of liberty, indeed, that thwarts the consolidation of a scattered populace into a strong nation bolstered against foreign imperial incursion. An excess of freedom manifests in a populace splintered and perpetually splintering against their organization, in a proliferation of regional oligarchies, warlord fiefdoms, or the allures of clan and kinship.

In his programmatic lament, Sun famously introduces a metaphor of the Chinese condition, of the perpetual failure that stunts and invites the formation of the political. He likens the Chinese populace to a "sheet of loose sand" (*yipan sansha*), whose "particles will slip about without any tendency to cohere" (1924). In stark contrast to the vital upswell of nationalistic elements elsewhere, he designates the condition of a populace defined by its tendency to perpetual disarray in a metaphor of geological, physical undoing: the un-cohering, and therefore un-capacitated, geological anti-form of sand, whose constitutional resistance to stabilization in turns thwarts its potential resistance to imperialist powers clamoring to capitalize on an ineffectual China. Resolution of this sandy social condition through political practice demanded it "become pressed together into an unyielding body like the firm rock which is formed by the addition of cement to sand" (1924).

Sand moves. It breaks apart, it makes its own solidity a political end rather than a material given. For Sun, sand, like the condition of a China that could be so easily pieced apart by foreign imperialists, denotes the condition of a specific geologized instability, a powerful passivity that functions almost as a structural resistance to the organizational forms required of a strong, modern nation. In his account, the shape of a modern Chinese political and social form come into view simultaneously through the narrative of geophysical stabilization through which loose sand becomes firm rock. The nature of a society wrought metaphorically in the disintegrations of sand demands a state whose very revolutionary modernity is framed in terms of the construction, rather than the discovery, of a society out of disjointed elements rather. The nature of this construction is given, by Sun, in terms of a relationship with unstructured materials, where society becomes sand, and sand is to become cement.

The metaphor of society as sand makes visible as a political problem and object a vision of social form that departs from a remarkable tendency in modern political philosophy to tether political community with organic forces and forms. Pheng Cheah importantly identifies as a recurrent "analogy between organic life-forms and the technic of social and political organization" (1999:230) as a prominent feature of the theory of the nation from European Romanticism to postcolonial liberation movements[5]. Such an identification of society with biology also crucially

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his revolutionary credentials are cited, but, I argue, crucial to this is also the first nation-constructing vision of politics he elaborates, a vision that the CCP claimed to have realized in its invocation of Sun.

[5] The nation, in such a view, is not merely a body, but an organism, a living, organized thing, animated by a principle analogous to the life force that sustains every other living thing. National and political survival here is to be read literally, as a *sur-vie*, a living-on of a political entity identified and endowed with life, and thus in danger of sickness, of death.

informs Durkheim's famous notion of organic solidarity[6], a conception of social form that is formally continuous with the self-organization of organic life.

The analogy of Chinese society with the structural instability of sand, in contrast, names, through geophysical analogy, an inertial impulse against the forms of self-organization associated with this organicist conception of nation and the starting condition of the European revolutions against which Sun defines Chinese specificity. If famously, in Michel Foucault's famous account of biopolitics, the political problem of 'population' emerges through a political investment in human species-life, massified aggregate of "men insofar as they are living beings" (2003:247), here, Sun constitutes a vision of China as a geological quantity prone to crumbling. Breakdown is an erosion rather than a decay. The formation of a modern Chinese politicum, and thus the *raison d'état* of a Chinese political form, is indissolubly linked with the structuring function of a stabilization of loose materials, materials otherwise coming apart. The form of collectivity interpellated through political problematization as a sociological fact is stunted by its own sandy properties rather than held together by its organic autopoeisis.

Geographer Bruce Braun, in his study of geological thought in 19th century Canada argues that a discourse of geology "not only enabled landscapes to be visualized in new ways" but indeed made possible new political rationalities that intertwined with "the historical emergence of 'population' as a problem of government" (2007:13). Geology, as a set of material processes and as a way of knowing the earth, entwines with knowing and governing 'populations' different from those offered in the rubric of the biopolitical. Sand names not merely a failure to organization but the starting political condition of a Chinese social entropy that continually undoes it, warding it off [7]. If, as Ann Anagnost argues, early modern Chinese nationalist thinkers invoked 'society' through the anticipatory structure of a prolepsis (1997), Sun's geo-social metaphor enacts the particular problem of Chinese state and future society through a vision of stabilization of social-sandy particles, wherein geological thought is the condition of an idiosyncractic political sociology of Chinese modernity. For Sun, the political task at hand, one that defines the role and legitimacy of a properly modern and properly Chinese state, must be understood as continuous with the stabilization of loose elements[8].

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[6] Durkheim famously argues that the integrative force of organic solidarity exists not merely in analogy with organic, organized life, but as the evolutionary extension. Social organization draws its cohesive power as a function of the substantive continuity that society shares with all living things, scaled up into a supra-human entity that exceeds psychology and (individual) biology.

[7] Pierre Clastres' *Society Against the State* (1989) offers another political philosophy that hinges of a vision of 'society' as a machine for the rejection of a state-form that always threatens to form. Here, the difference is instructive. While both thinkers can be understood as generating an ontology of the social in relation to the political, the relationship is not symmetrical, and this asymmetry is made clear by Sun's particular reference to sand. Sun's vision of society is not a matter of a resistance encoded into the very forms of social life but rather the operation of a geologized entropic principle that thwarts organization through a powerful *in*capacity. Thus while Clastres suggests certain societies exist through the active neutralization of political power and social hierarchization, Sun's sandy sociology suggests that a state, and a strong one, is fundamentally necessary to the modernization and survival of a society that it must also actively construct and maintain through a constant application of force.

[8] This resonates deeply with Ssorin-Chaikhov's distinction, through Soviet government, of Hobbesian and Durkheimian versions of the social. Crucial to a Hobbesian governance, he argues, is the reference to a "condition of perpetual disorder that both defies and invites state intervention. If specific forms of statehood are very dynamic historically, in time, discourses on failure and inefficiency are perhaps among the few coherent constructs in a landscape of otherwise historically unstable political forms" (2003:7).

I suggest that we read the metaphor as defining a field of political problems and objects through the alignment of a Chinese state through a necessary work of 'stabilization.' Sun's China is sand and shifty society. His politics is attuned to the chaos and transformation of loose things; it is a politics of particles undergoing physical transformation against their own tendency to dissolution. Such a work suggests the general constitution of a political field that evaluates things in terms of an attribution of physical properties – disorganization, crumbling – rather than an *a priori* bifurcation of the world into human and nonhuman things (Latour 1993). Homed on sand and society alike as things given over to their own comings apart, stabilization also grounds the *raison d'etre* of a modern Chinese state, in Sun's estimation, with a task of transforming geo-social things, holding them together. Stabilization - the structural, physical changing of loosened things - defines, I argue, a political problematic that makes earth and society *both* things to be controlled.

The enforcement and achievement of geostructural transformation remains a *leitmotif* of subsequent political moments in China. The metaphor of China as loose sand, despite its own connotations of shifty, disorganized materials, retains a remarkable longevity in modern Chinese political tradition, especially as a rationale of social intervention. Mao Zedong, for instance, could claim the Chinese Communist Party as an inheritor of Sun's revolutionary mantle by asserting that for the first time in China's history, the Party had "led the people in waging a long arduous struggle" that finally made them "able to change to being united from being like loose sand, a condition which favored the reactionaries' exploitation and oppression" (2004[1955]). Here, and elsewhere in Maoist thought (2004[1938]) the CCP's legitimacy stems not only from the inherent ideological Truth of Marxism-Leninism, but also in the demonstration of a capacity of the Party to stabilize a disorganized society against internal and external threat - destabilizing elements.

Decades later, in the heady experiments of market reform, maintaining and enforcing 'social stability' (*shehui wending*) against an ever-present specter of chaos - ethnic strife, market forces, foreign breaches of sovereignty, to name a few - has been a central element of post-Mao statecraft. A recurring concern with the maintenance of stability has been a shibboleth of Reform. From infamous state deployment of military forces against demonstrators in Tiananmen Square in 1989, where the Chinese government "crushed the popular protest as a threat to 'stability' (Zhang 2001:16) and a sense that Reform had unleashed a potentially uncontrollable disordering force into the geobody politic, to more recent crackdowns on 'ethnic unrest' and the 'splittist' cells that are perennially represented as disorganizations and fractures.

In the desertified sandy regions of semi-arid and arid upwind China, the trope of loose sand becomes remarkably literal, as forestry bureaucracies across China reframe their contemporary institutional role against desertification. Here, the metaphor of loose sand turns around to focus political investments on the desertification that threatens a full quarter of China's territory, rendering them, indeed, into sheets of loose sand. In the following sections, I consider how stabilization as a political rationality works in practice. What is the specific character of the instability of desertified places and their mobilized dunes, and how is this instability elicited as a scientific and governmental fact? If the earth has lost its moorings, in this convergence of geophysical and political destabilizations, how would the political landscape of northern China shift to arrest the unratified movements of sands loosened to the wind?

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The Wind Tunnel

The early spring is a busy time at the Cold and Arid Regions Environment and Engineering Research Institute (CAREERI) in Lanzhou, northwestern China, the central research institution under the Chinese Academy of Sciences for developing techniques to combat desertification. Located in sandy Gansu, a province dotted by desertification field stations and demonstration sites and being slowly overrun by expanding deserts, the institute serves as a coordinating center for many research stations spread over the country's arid and semi-arid lands. It is the center of a scientific and engineering establishment that, since the 1960s, has arisen in response to the problem of the desert. Desertification research and the engineering techniques that it seeks to develop configures its own geography of sandy places, which are differentially drawn into a national program of sand control, a series of landscapes whose problematic geomorphology is here enacted as a technical and scientific problem.

In the sciences of desertification and dust transport, experimental apparatuses like the wind tunnel are key, not simply as communicative and aesthetic technologies for illustrating a particular material truth (Shapin and Schaffer 1985), but also in multiplying and specifying the ways landscapes become amenable to certain kinds of political and material intervention. The enactment of deserts as soil samples, and then of Aeolian desertification and blown sand formation as a matter of sand-wind interaction has important consequences for the problematization of vast tracts of land. In exploring the wind tunnel experimental apparatus, I suggest that the starting conditions of the experiment are already conditioned by specific understandings of instability, generally, as a political problem, and that the experimental generation of tiny, contained dust storms is a way of visualizing the earth as already unstable. This instability – against which infrastructural logics are articulated as a naturalized solution – is indeed pre-ordained in the processing of geological materials, through sieving, dehydration, and other preparatory techniques that indeed seeks to achieve maximum wind-mobility.

This enactment of a complex of social, political, and physical conditions as a reflex of the various states of dune stabilization offers a clue to understanding the experimental and epistemological machinery of desertification research in CAREERI. Beyond this, they make clear how the enactment of blown sand, as a proxy for millions of acres of desertified land 'in the field,' is both shaped by the specific properties of the materials and the embedding of the political logics of stabilization into the experimental design. In an engineering institute, where research historically and currently is situated in relation to developing concrete and practical engineering techniques for blown sand control, there is no hard distinction between pure and applied sciences. As in early modern China, where the doctrine of *ti-yong* (substance-function) (Levenson 1958), articulated the adoption of western sciences as a practical and important means of ensuring national survival, to the 'scientific' character of socialism in general, in a Chinese Academy of Sciences research institute, the sciences of dust storm formation emerge as specific strategies for formulating the conditions of national survival.

How wind and sand are known as objects is a question embedded in the specific politics of their control, as well as the particular ways in which the materials themselves behave. Donna Haraway, writing of biology, argues that "human are not the only actors in the construction of the entities of any scientific discourse; machines…and other partners….are active constructors of natural scientific objects." In this, the object of knowledge works as a "material-semiotic actor" whose properties also shape the apparatuses through which it is also produced (1992). Wind and sand thus not only emerge as objects of knowledge, but as things that condition the forms of

intervention through which they are to be controlled. Centrally important to this is an understanding of how blown sand emerges as the crux of desertification research to become near-synonymous with desertification itself. A cast of scientists, engineers, machines, and sands emerge as key actors in determining how blown sand can condition the formation of new governmental topologies and topographies.

In this section, I offer a brief history of research into sand stabilization in China and the international history of aeolian physics - the physics of wind and sand - through exploring how blown sand is experimentally generated at CAREERI. I focus on the institute's wind tunnel, where fan-driven winds blow over sands collected from various places designated blown sand source areas around China. In the experimental inducement of sand to phase into *wind-sand*, I argue, a political investment in the solidity of land is imaged in its failure, as the earth becomes alive in an oscillation of phases, from solid to fluid, from instability into mobility.

In the wind tunnel of the Chinese Academy of Sciences' desert research labs in Lanzhou, Aeolian physicists prepare to build a dust storm. They load samples of sandy soil, gathered during field research in their desertified sites across China, into one end of the long, Plexiglas tunnel. With a special rake, they shape this pool of sand into a flat sheet, the bed of a tiny purpose-built desert, a metonymic enactment of the potential 'dust storm source area' that the sample comes from. Activated by computer from an adjacent room, the wind tunnel's large wooden fan begins to turn, gaining speed as it pours air in a flowing stream over the carefully prepared dirt.

At first, this fan-driven wind passes over the sandy bed, a sheer force skimming and scraping its surface. This is an in-between time, where the earth and air of this experimental desert remain a terrestrial and an atmospheric volume, adjacent and separate at the sand's surface. As the fan-blown air continues to work over this represented desert, however, the sand begins to quiver as particles entrain in the air's traction. In motion, the air and ground shift from discrete spaces into interacting substances, and the horizon that divides them becomes a site of geo-atmospheric activity. At this turbulent surface, sand and wind organize as particles in a fluid medium, a flowing substance that Aeolian physicists call blown sand (Bagnold 1941, 1990). While the larger particles in the sandbed fan along the tunnel's bed, moving forward in a chain of dry waves, or bouncing and crashing frenetically in the air, the finest dusts and silts pour forth as an emission off the fluid microtopography of blown sand.

This suspension of particles in the mechanical air is a tiny dust storm rolling through the conditioned airspace in the wind tunnel's clear walls. Its plume is a material enactment, in elegant miniature, of the massive dust storms that have, in recent decades, drawn political attention in China and places downwind as a fretted harbinger of the northeast Asian springtime. Tracing their trajectories reveals sites at which the earth can distribute into the atmosphere. In the wind tunnel, the genesis of a dust storm is given as matter of suspension itself, a relationship between soils and airs as interacting things. Where the wind tunnel makes the air appear as a medium that holds the earth, the solidity of sandy lands appears as one phase of a substance that can creep like a liquid or disperse into dusty atmosphere. While the tunnel's air blows dusts in coursing suspension, the earth becomes a virtual plume whose susceptibility to suspension might be activated in problematic relationship with the wind.

Forestalling dust storms emerges politically and technically as a matter of intervening in the conditions and interactions in which land and air become interacting substances. It is a matter of controlling the conditions of suspension through, to borrow an ecological construction slogan in desertifying Inner China, 'blocking wind, holding sand' (*fangfeng gusha*), the determination

of an environmental politics geared toward the relationship between earthy and airy things. Chinese dust storm politics organize against the phases of suspend-able earth, organized around a politics of materials aimed at preempting the moment at which dust and wind become a suspension, lifting up in a perversion of the boundaries between things on and above the ground. They cast the surface of the earth, the horizon, not as the break between terrestrial planes and atmospheric volumes, but as an interface between fine geological particles and their airy medium, to be locked in place, lest the earth become a sky.

The room the tunnel sits in is piled haphazardly with huge sacks of loose sand, collected from CAREERI's multiple field stations, which together produce a sandy profile of the country's desertification. Assembled near the wind tunnel, these dirts compose, metonymically, a national cartography of loose earth. Each sample of dirt, through the tunnel, comes to stand in for a shifty place where it was collected, and, in the tunnel, their primary property becomes clear: the specific ways they move with the wind. As the fan moves the dirt at standardized air speeds, loose earths are graded into states defined by their potential motion on the wind. The fan phases sand into wind-sand, and makes the places where these sands come from legible in terms of their differential geological mobilities.

The tunnel revisioned the desert's activities in an experimental system that was generated and constrained by the machine and its inputs – sand and a fan-generated wind – a "fragment of reality, or a piece of the universe which [it] arbitrarily isolates to define certain of its parameters" (Rheinberger 1994:67). The desert becomes, in its length, sand and variously rigged windspeeds, and sand becomes a potential *fengsha.* In turn, 'deserts' are wind tunnel experiments scaled up, as 'field' and 'lab' no longer stand as original and copy, but as restagings of one another.

Potential motion - a desert made definitionally unstable and potentially fluid - became the specific parameter that the tunnel would seek to produce and study, with reverberations for how the desert would be given as a technoscientific and political problem, through which an apprehension of China's desertified territory as various threatening potentials to motion could be generated. In the wind tunnel, the desert becomes a landscape for which potential mobility is its defining material and political feature. In the wind tunnel, and in the desert for which it was an experimental stand-in, the earth is no longer itself. Its stability, fixity, and solidity shift from definitional qualities to temporary states, a moment of rest in an unending oscillation of motion and stasis. Its very earthiness evaporates into potential motion in its interaction with wind and its animation into fluid substances held in flowing form by sustained airflows.

Scalability emerges as part of the experimental apparatus through which blown sand comes to scientific and governmental meaning. In the tunnel's identification of the physics of flowing blown sand with the shiftiness of desert topographies, it invites us to consider the behaviors of particles interacting with simulated wind, flowing "like a gas, like nitrogen spilling and spreading" (Welland 2011:146) as an elegant, manmade dust storm whose properties could be captured with precision photography and aggregated by software. This identification of a contained, machine-made sand and dust activity with whole environments is generated epistemically by the wind tunnel through a fractalizing quality of sand and wind that underwrites an identity across granular and planetary magnifications and expands the wind tunnel to the environment.

This has to do with repetition, as well as chaos, as a crucial component of the scientific elaboration of blown sand as a material-semiotic actor. The father of modern blown sand physics, RA Bagnold, writes that the desert exhibited "a simplicity of form, an exactitude of repetition and a geometric order unknown in nature on a scale larger than that of crystalline structure"

(1941:xix). The desert was, by nature, scalable, and could be modeled through an experimental reduction in wind tunnels that would, in principle, not change its formal qualities. This scalability would make possible, in one way, the scaling up of 'local' anti-dust storm techniques into the scale of regions and the macro-geographies of a windy national space. Modeled at scales as disparate as the microphysical interactions of grains of sand with the wind, or desertifying regions and the world's atmosphere, wind and sand form the material and conceptual infrastructure of a scale-making project that emerges, tracing out atmospheric connections in swaths of dust, without reference to 'the global' as a relevant condition. If "scale is not just a neutral frame for viewing the world" but "must be brought into being" (Tsing 2004:58) in a process of cultural and political ramification, the fractal - and thus scale-less - constitution of blown sand itself contributed to its capacity to stand in simultaneously for many possible scales.

This scientific determination of sandy places through their geomorphological instability is the condition for a governmental rationality of intervention into desertified places that constitutes them as vast stages to be stabilized against their powerful capacity to motion. These techniques will be described in fuller detail later in this chapter, but they take on the quality of programs of construction, strongly echoing the historical imbrication of desertification research with the construction and maintenance of physical infrastructures threatened by sand. An expansive toolkit of planting strategies, semi-permeable barriers, and stabilization techniques speaks to this alignment of environmental intervention with engineering fixes, techniques for building a stabilized topography out of loose sand.

Thus, as the wind-tunnel generated blown sand, it was also a key element in the introduction of a radically mobile conception of land that bound the earth and air in a relationship that was itself dangerous. In desertification, earth and air did not stand as two adjacent but separate orders of environmental reality divided by the stability of rock, but two substances whose mutual interaction would yield a flowing third. Desertification shifts from a process of ecological degradation to one of geo-atmospheric activation and 'blown sand source areas' becomes comprehensible as an Aeolian engine, generative of its own unending transformation. Making the earth less susceptible to its own phases became the object of a massive political apparatus of geophysical stabilization through forestry through which the relationship between air and earth as interacting substances could be neutralized again.

Figure 4: Wind Tunnel, Lanzhou, Gansu, China.

Here as sand samples move and ripple on standardized fan-driven wind, the machine and the scientific-political apparatus into which it assembles, plays a crucial role in visualizing a political ontology of land that takes problematic mobility rather than guaranteed fixity as its theoretical grounds. Here, the contained and controlled creation of blown sand enacts desertified places as sites of a protean substance that phases the land from solid to fluid to vapor. This apprehension of a physics of blown sand in turn generates a shifting political cartography in forestry programs, seeing geophysical and political geographies and zonings contend in multiple remakings of the shifty geomorphology of north China, with consequences for life and livelihood on pastures increasingly understood as part of a broken landscape to be stabilized, calling for infrastructure.

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Building on Sand

From the front seat of a local government off-road vehicle with a small Mongolian wolf totem swinging wildly from the rear-view mirror, Mr. Su, a prefectural forestry planner, explains desertification in Alxa. The ride is rough as the driver swerves off the freshly laid road where it has been engulfed in yellow dunes, rendering the road not only unusable but invisible at many

points along its stretch. We are driving to survey the site of a planned tree- and shrub-planting project that is to run along each side of a stretch of railroad track that has, in the last two years, seen sand cereeping up the sides of the rail's raised bed as the desert has spread past its route. He takes readings from a satellite GPS device which a deputy forestry official dutifully records in a notebook filled with pages of running numbers. GPS, he notes, makes the enterprise more scientific, and is an attempt to recover a locational fixity in a moving landscape.

Desertification has transformed the landscape here through the degradation or burial of grasses that prefectural forestry officials see as a cased of failed natural infrastructure. Mr. Su explains, "Desertification in Alxa has four causes: over-cultivation, over-grazing, over-cutting of vegetation for tinder, over-opening of marginal land to use. Each of these has the same effect: it makes the surface vegetation disappear so that their roots can no longer hold the sand underground and so their leaves no longer protect the soil from the wind. Without grass and vegetation to hold sand, *wind-sand* is a problem. These 'four overs' lead to a 'environmental breaking' (*huanjing pohuai*)." This term, *pohuai* or breaking, suggests the sense of damage to a physical thing, the breakdown of a functional object. With roots to bind sand and above-ground shoots and leaves to dampen wind, the sand had, as it were, lost its cementing structure. Its repair was to take the form of an infrastructure that built stability into the sand, converting much of the China upwind from Beijing into a wide swath of construction zone for a new forestry landscape.

Recent ethnographies of infrastructure have asked questions that shift the focus beyond the built world to ask how infrastructure organizes new political and environmental constellations of things and logics. 'Infrastructure' is thus not only a gesture at material systems, but also an increasingly important and multi-faceted rationality in contemporary planning and governing through which 'natural' things are assembled into agglomerated material systems, one that reorganizes and often obliterates a clear distinction between natural and built things. Bruce Braun and artist-activist Stephanie Wakefield demonstrate that in the aftermath of Superstorm Sandy, where the concrete 'old' infrastructure of seawalls became very evident in their failure, post-disaster planners have increasingly invoked what before were elements of a riverine nature, like wetland as part of an urban-environmental infrastructure for absorbing floodwaters or breaking tidal waves. Anthropologist Ashley Carse's ethnography of contemporary schemes to provision the Panama Canal with reliable sources of water (2012) takes this infrastructural logic further in that it comes to consider and engineer watersheds and agricultural practices as part of the technical apparatus through which the canal operates.

Here I build on Carse's insight that in such a view, 'infrastructure' becomes a logic of assembling disparate elements into relation such that "a landscape becomes infrastructure for one system of production" (2012:2). Where Chinese anti-desertification programs depart from this definition, I argue, is that they recover landscapes to be engineered into stability as part of a national infrastructure that seeks to delimit and control spatial relations rather than enable them. That is, the remaking of desertified regions as and through infrastructures meant to neutralize blown sand aim not to sustain a system of production but instead, the delicate territorial fiction of a "national geographic" (Malkki 1992) in which a national territory can be demarcated into discrete spatial units. They seek to split and contain connections rather than enable them, ultimately to domesticate the powers of the wind to move the earth.

In forestry reckoning in Alxa and other sites in China, the politics of sand control have operated through a practice that conceives of sandy landscapes as topographies lacking in and therefore demanding infrastructure. Where Mr. Su's understanding of the root causes of desertification continually focuses on the failed structural properties of grasslands turned to sand

dunes, the solution, unevenly implemented by forestry agencies, has hinged on a reconstruction of stability into the land through planting schemes, the use of synthetic and chemical solutions like spraying petroleum, and more generally, the literal construction of structures into the sand's surface to block and manipulate winds. Such programs are usually described as programs of 'ecological construction' (*shengtai jianshe*), a phrase that reverberates with political overtones that reference the communist body politic as something that was to be 'constructed' by the Party, just as loose sand in Sun's vision is cemented into rock through an idiom of construction. A political rationality staked to the stabilization of unstable thing thus realizes itself in a series of technical-political projects to 'build' new properties into unstable land.

Likewise, at the desertification research institution in Lanzhou, Professor Yang, a desertification scientist whose research focuses on engineering solutions, explains desertification as a matter of structural damage to the earth's surface (*dibiao*). "There are several types of change. One is 'wind erosion,'" which she says in English. "So there is strong wind, and there, the vegetation is broken (*pohuai*), then the wind blows and lifts sand, this is a common process. When the vegetation is broken, so is the land's form." She continues, "In China, such a process happens when there is a mix of factors. First, when the climate is dry. Second, when the earth's surface is composed of sandy particles. In many of these places, spring winds are especially strong. When over-grazing, over-cutting, and over-farming break the vegetation, these winds act on the soil, causing wind erosion. Irrational human activities (*buheli renlei de huodong*) here break the earth's surface by breaking the vegetation, and so the wind erodes the land by interacting with sandy particles." In the process that she describes, vegetation exists as an infrastructure that has been broken into a state of failure. The intactness of the earth's vegetation becomes part of a protective infrastructure that shields the land against the wind.

Vegetation is thus evaluated for its physical properties and capacities - grasses are a structural component that consolidates the earth's surface through rhizomatic spread. Its above-ground structures dampen winds and thus thwart the interface of sand and wind. It conjures a vision of environment that is consistent with a determination of desertification as a matter of a geostructural breakdown demanding a rapid renovation that will resolve the motion of sands and dusts on the wind into a solidity that is emerging as a poignant end of politics in a destabilized landscape. *Huanjing pohuai*, environmental breaking, must be understood as a physical damage to the grassland as a sand-fixing infrastructure whose function is to be realized again through sand barriers and strategic plantings.

The relentlessly physical understanding of vegetation here considers grasses through their structuring functions as the failing infrastructure of a landform. Its primary quality is not its relation to an ecological system, but a physical one, part and parcel of the emergence of forestry landscapes as part of a national architecture of sand-and windbreaking infrastructures; for this reason, in the harsh environmental conditions for growing in windy, dry Alxa, environmental interventions could substitute nylon netting or chemical binding agents for the sand-fixing functions of grass and shrubs. This functional and physicalist apprehension of vegetation informed the many techniques through which forestry engineers sought to building a proxy infrastructure onto sands.

Plantings, or what Dr. Yang calls 'biological techniques' however were preferred as a matter of cost and efficiency. Where nylon would wear out of become buried, plantings, it was hoped, after they survived and established the first crucial seasons would continue to grow and adapt structurally to the shifting landforms. The techniques through which forestry engineering efforts worked, in most cases relied on plantings, either through aerial seeding of grasses or the

labor-intensive planting of individual trees or shrubs. Vegetation thus becomes a self-elaborating construction material in a landscape grasped as a great and unstable physical structure.

Other engineering solutions existed. The construction of 'straw checkerboards,' the labor-intensive grids of organic materials - grass, wheat stalks, cornstalks, depending on the cheaply available local material - aim at creating a low shield on the unstructured dune surfaces from the wind by creating a surface roughness that breaks up the smooth flow of the wind. Such techniques are ubiquitous alongside roads, rails, and sites like mines and factories in Alxa, which in places extends to the visible horizon in a rolling, quilted sea of dunes.

There is no sense of a primordial nature at stake in this forestry zoning through which desertified places become construction sites. 'Nature' was not at stake in this vision of environmental transformation, neither in the sense of a wilderness that preceded its spoilage by human trespasses (Cronon 1996), nor in the sense of a vital ecological flourishing. So even as plantings were a primary technique of stabilization, it was the economy and effectiveness of root and above-ground structures, rather than any self-evident preference for 'natural' methods. Organic materials were preferred for their availability as a by-product from agriculture, a cheap basic material out of which low windbreak grids could be built, but in other places could be substituted by nylon sandbags, or other synthetic materials. Perhaps paradoxically to a Euroamerican environmentalist imaginary, in many places, 'chemical measures' such as spraying a sheen of petrochemical binding agents on the sand to hold grains to each was a viable alternative for preventing the formation of blown sand.

Figure 5: A green plastic 'plant' has been anchored in a dune near a biological bush to dampen surface winds.

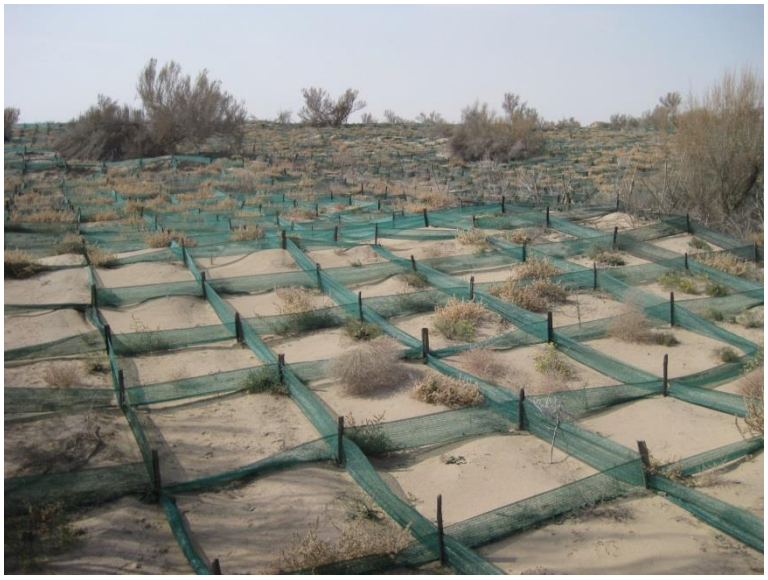

Figure 6: at a desertification engineering demonstration zone, a grid of nylon netting acts as a sand barrier to catch sands in their movement and to block winds at the surface. These nets aim to neutralize the effects of wind and create a tiny stabilized square where pioneer species can establish.

Ecological Construction and Windbreaking

Even as these engineering techniques aimed to dampen the wind, the wind could be harnessed to great effect, reappropriated as an agent of construction and not merely erosion. Some techniques deployed an understanding of the aeolian physics of sand dunes to harness the wind's energies into an efficient tool for reshaping the land. One widely practiced and circulated technique, developed in China and disseminated through seminars to Israeli and African foresters dealing with their own dunes, was a method called 'blocks, pieces, strips' (*pian-kuai-tiao*). It sought to generate a topographical geometry of barriers and holds on the windward slopes of mobile dunes, whose final purpose was to create a structured side in the wind that would facilitate the leveling off of the tops of dunes.

First, the windward bases of dunes were stabilized into blocks with grids and barriers. In the microphysical environment in the wind-shadow at the dune's base, saplings would be planted and watered in chunks, 'pieces,' in order to produce a second, cumulative wind-shadow higher up the dune's slope, where a third row of shrubs would grow in a denser surface cover. Construction proceeded in a step by step deflection and utilization of the wind's energies. Having secured the bases of dunes, where aeolian activity was weaker, the tops of the dunes would blow away in the next gusts, flattening the dunes such that they would no longer be susceptible to the wind. Such a technique sought to use the wind as part of an expanded environmental engineering toolbox to carve out and create a landscape that would conform to the infrastructural demands of dune stabilization programs.

Nowhere is this technique of construction and the fantasy of stabilization that it embodies clearer than in the forestry engineering demonstration sites that serve as showcases for sand control technologies. Several hours from the institute in Lanzhou by train and jeep, is *Laohukou*, 'Mouth of the Tiger,' a gap between two mountains that is notorious for the strong winds it funnels through to the sandy lands on its leeward side. Laohukou has become an exemplary site of sorts - it is officially part of the Three Norths forestry zone, and is a demonstration site for the

latest in dune stabilization techniques, a plain of rolling dunes that have had windbreaking infrastructure built on top of it. The transformation of mobile dunes into a spectacular infrastructure of windbreaks suggests its own replicability, and the taming of the Tiger's Mouth against the winds is offered by forestry engineers as a vision of what all of desertifying north China could become. A grid of boxy squares has been dug and built into the dunes' rolling surface, giving the field of dunes the effect of an undulating, quilted landscape (fig. 3). Environmental engineers proudly display this landscape to visiting officials, and environmental slogans are spelled out in the sides of dunes with the materials used to hold them in place: 'Block the wind, fix the sand (*fangfeng gusha*)!' Dunes held in place through a highly visible structure are a spectacular embodiment of the SFA's project of topographical stabilization, and they announce here, a coming triumph of the state against the sands.

Figure 7: Laohukou, 'Mouth of the Tiger' Three Norths Shelterbelt demonstration site. Straw checkerboard barriers are laid out in an uncharasteristically aesthetic pattern, underscoring the spectacular nature of this demonstration zone. A slogan has been written on the dune in sticks and surrounded decoratively by nylon barriers. The slogan reads "Block the Wind, Hold the Sand"

As a political and material infrastructure, the stabilized landscape in its uncanny naturalness, gave less a sense of final control over chaotic natural processes or the wind's capacities and excesses, as it drew attention to its own improbable existence. The strange and visually striking nature of this landscape, consistently referenced itself as the tremendous realization of political will that such infrastructures exhibited. The ability of the state to gather and coordinate labor in the generation of such a temporary infrastructure. The transformed landscape stood as a profound testament to its own existence and the state which could produce it. Brian Larkin, in his historical ethnography of colonial construction projects in Nigeria, writes that "[u]nderstanding the provision of infrastructures as a work of state representation as well as

a technical process pushes us to examine the conceptual mechanism that lay behind infrastructures and translated these objects into cultural forms" (2008:19-20). The infrastructure of windbreaks built onto the dunes is an exercise in making infrastructure visible in terms of its replication. The sand barrier technologies on display - decidedly low-tech, demanding a high input of labor, usually from locals whose farm and pastures have been inundated by sands - suggest the possibility of recuperating a populace of people displaced by sand as a labor force for the construction and maintenance of this great infrastructuralized nature.

Figure 8: At another section of the demonstration site, other slogans have been buried.

But, as all things in the relentless tangle of winds and sands, these great infrastructures were subject to, and visible in their slow obsolescence. The wind continued to blow, transporting dust from beyond the mountains, and eroded the clean lines of the grid. As the slogans spelled into the earth with construction materials as a proclamation of the official environmental will onto the landscape itself were gradually splayed into disrepair by the shifting of the dunes in which they were forcibly installed to impress visiting officials and news teams. The slogans, inscribed on the dunes, come apart into illegibility, a mockery without a speaker. Or, they would be gradually lost as the wind coursed through Tiger's Mouth Pass and buried dune stabilization in new dunes, deposited from unstable upwind places. Despite the fantasy of stabilization and finality encoded into the rectilineal sweep of a sand-holding grid rolling into the distance, his quilted desert inevitably failed to create an impression that the desert could be finally controlled, in that in years, these checkboards and barriers would be again buried by upwind sands, or the sandblasted barriers would fray and decompose into sandy dunes once again. I think of tree-planting projects I have participated in, where shovels digging out the ruts for new structures and saplings inevitably hit the buried ruins of some other infrastructure, some other forest lost in the

wind. Building on sand, all triumphs could only be temporary, and in time, sand accumulates on this structure, too, until it is buried again.

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Coda

The Sisyphean construction, burial, and reconstruction of infrastructures onto and against the sand bespeaks a much more profound sense of the reimagination of the national territory as a potential atmosphere, as sand lifts into storms. The terrestrial landscapes of the country are remade, by the potential movement of *wind-sand* as channels for a fluid current of earth. Landscape elements like broad steppeland or narrow mountain passes become conduits through which airflow is forced, spread, dispersed, concentrated, sped up. Mountain ranges and passes become terrestrial banks and funnels, steppes become broad basins. In the onslaught of mobile sand, these infrastructures, built and buried to be built anew, indicate a larger change in the understanding of China's national territory, no longer a jigsaw of contiguous and non-overlapping provinces, but a series of places linked, problematically, through dusty atmospheric connection and the potential motions of the land.

In this, a vision emerges of Chinese politics as an ongoing labor of stabilization, unfurling in infrastructures that rise and recede into a dissolution that lurks inside governmental objects rapt in a powerful and perpetual entropy. Stabilization and infrastructure work as part of an ongoing push to rethink the objects, conditions, and techniques of politics in China. While this chapter has concentrated on demonstrating that the physical characteristics of the materials under question, sand and wind, were consequential in shaping a politics of their control, I do not mean this to indicate the what I have attempted to elucidate is a politics 'proper' to matter, as if other politics could be proper to humanity. Recent attempts in science and technology studies and political theory (cf Braun and Whatmore 2010) have done the provocative work of attempting to delineate a politics derived from 'things' themselves, but I have focused on stabilization precisely because it makes no *a priori* distinction between social and geological things, nor does it collapse one into another. Rather, in their juxtaposition through political trope, each elicits a particular quality of the other – the moment of their relation in a 'sheet of loose sand' makes a property of mobility or inertia evident, just as a wind tunnel enacts a specific reality of sand as a substance in virtual motion. Stabilization is a way of cutting into a reality in a way we are perhaps not accustomed to, but then, there is a long history in Chinese literature and thought of geology's unexpected qualities[9].

Fengsha, wind-sand, is evocative in its conjuring of a blurring of states, where wind and sand come into relation and where this relation beckons in the form of a phase transition by which solids flow into fluids, and the land has become the image of motion rather than the static stage on which other dramas play out. In its motion, ground becomes figure, held up as a fretted and fascinating matter of concern, drawing the attention of those gathered by its sweep.

This chapter has laid the groundwork for the envisioning and scheduling of a northern China evident as an expanse and source of blown sand into a coming national infrastructure

[9] Literary scholar Jing Wang, in her reading of three of the four classic novels of China, argues that in 'stone lore' stone appears not as "hard, rigid, fixed, and barren," but rather as having many possible properties of dluidity, fertility, and animacy. She argues that in the classics of premodern Chinese literature, "heaven-bound magic stone[s]" (1992:36) abound, and participate positively in the production of meaning..

against deserts and storms. I have plumbed an idiosyncratic line of Chinese political thought that takes politics, society, and geology as interacting moments in a broader political process of stabilizations. Thus, I argue that political and geological phenomena have not merely been posed in opposition, but rather the new attention to sand control at multiple levels of government in China has seen the scales, spaces, and techniques of government shifting with the anticipated courses of blown sand. At the convergences of geology and sociology, this is a signal not only to conceive of a capacity of sands and stones to enter politics, but also to think with the political ontologies that found a modern Chinese self-reflection through its relationship with sandy and social things.

Chapter 2: Groundwork: Markets as Environmental Technology in Alxa

In the last weeks of March into April 2012, this corner of Li family's plot of ex-pasture in Alxa, western Inner Mongolia, China, buzzes with activity. Workers are busy planting shrubs, wearing bright scarves over their faces to protect themselves from the dusts that whip around our boots and peel off the surface of the dunes. I walk with Mr. Li as he inspects the workers, mostly ex-herder women hired as day laborers, moving in groups of three. They plant files of *suosuo* saplings in straight lines across the undulating topography of sand dunes, one sinking a shovel into the loose sand, a second carrying a bundle of saplings, a third setting them upright in the ground. Moving slowly between these rows, ex-herder men drive trucks hauling water pumped and purchased from a neighbor's deep well, spraying and tamping down wet sand around the scraggly root balls of the saplings, each the width of a finger and whipping convulsively in the unrelenting wind.

Figure 9. A woman re-plants *suosuo* switches that have been buried in strong wind while two men follow, spraying water from a truck onto freshly sunk saplings. A single *suosuo* sapling is visible in the foreground.

Suosuo is a hardy shrub adapted to the environmental and climatic conditions of the desertifying Alxa Plateau. Quotas for its planting emphasize its status as a key goal as a means of re-engineering of shifty desertified topographies into geophysical stability. For a local government increasingly aligned with the task of controlling the sands that have smothered these pastures, it is a key species, and securing its planting has emerged as the goal of an assemblage of new state techniques, strategies and incentives. Forestry officials value the plant's quick-growing roots as an effective 'biological method' (*shengwu fangfa*) of dune stabilization (Wang & Xue 2010:13), as the plant forestalls dust storms by generating an ersatz sand-binding and

wind-breaking infrastructure on and below the shifting surface of dunes. Forestry planners and local cadres have aimed to enlist ex-herding families like the Li's as agents in the planting of *suosuo* and other sand-binding plant species.

From a tentative promontory on the windward edge of a dune, Mr. Li invites me to imagine this expanse of sand as a future forest of shrubs, dampening the hard wind into a pleasant breeze, and catching the wayward dust in the screen of it brambly foliage. He oversees this transformation of his ex-pasture into shrubland, indeed collecting forestry subsidies for his efforts. In his estimation, however, he is not a *suosuo* farmer. *Suosuo*, while a key species for anti-sand forestry programs, is not in itself economically valuable, even with the forestry subsidies that partially fund its planting. For Mr. Li, it is another plant, another product, that drives this arduous work. When *suosuo* is properly established in the sand after two years, he explains, its network of roots will create a micro-environment suitable for the cultivation of *rou congrong*, a snake-like medicinal root that, that among other things, is valued in Chinese medicine as a supplement for virility. When these roots grow, he assures me, a market awaits, ready to absorb as much as he can grow.

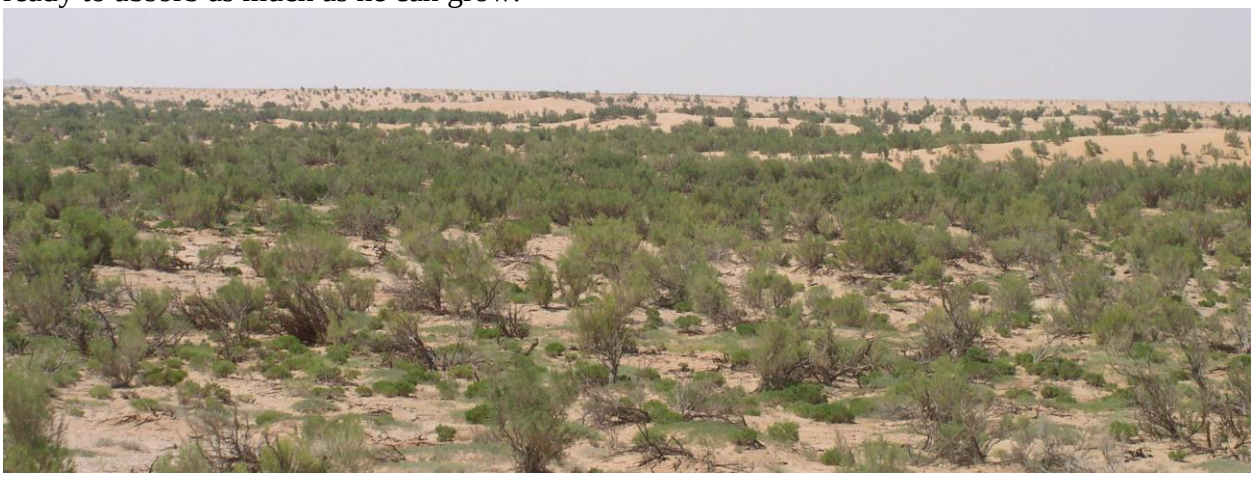

Figure 10: a mature *suosuo* windbreak forest

The creation of a market for *suosuo* as a way of converting ex-herders into *de facto* forestry workers in Alxa's Three Norths Shelterbelt project zone is one way among others in which forestry schemes have increasingly recuperated the traditional Reform tasks of economic development and social management into parts of an experimental but holistic eco-infrastructural strategy for building structure into the sandy ground. According to Director Teng, a cadre in the Banner government, a more general rearrangement of the financial, market, and policy conditions of (ex-)herder life has been a key tactic to either get people off the land to free it for natural or artificial recovery or, better, to keep them there as part of an eco-economic machine, coordinated by forestry agencies through the effectiveness of tightly-managed markets.

Where ecological construction is the goal, to be realized through the deployment of social life and labor *as* environmental variables and effects, it also the case, I argue, that local government has begun to approach its task as 'environmental.' That is, where economic development for its own sake may have been a goal in earlier decades of Reform, in ecological construction and forestry areas, human behavior is increasingly understood and then governed in view of markets as the relevant environments through which behaviors can be managed. This suggests that for officials in Alxa, controlling sand demanded the creation of new economic environments, where the fact of ecological construction could be increasingly rendered as a

reflex of well-calibrated economic conditions, like the markets that compel herders into groundwork. In an emerging governmental apparatus aimed at ecological construction, controlling and manipulating highly artificial economic conditions emerges as a way of conditioning ex-herders to behave as forestry workers even as they pursue opportunities in this state-built economy. Thus, alongside the coordination of plantings, forestry officials also manipulate the economic conditions in which herders operate as a means of redirecting their (economic) behaviors for desired and optimal (ecological) outcomes. In ecological programs, the economy has been reconceived as a certain kind of environment, a milieu in which human decisions and behaviors exist, and through which they can be governed.

'Environments' proliferate and entangle in this governmental formation. Foreman Zhao of the local forestry administration explains, "After grazing bans, herders have lots of land, but cannot use the land for grazing any more. This is not an acceptable situation because then people have nothing to do…so we encourage herders to plant *rou congrong* because it gives them income and also improves the ecological environment (*shengtai huanjing*)." This improvement of the ecological environment, however, depends on the manipulation of another so-called environment, another *huanjing*. Zhao continues, "They [herders] won't [plant *rou congrong*] without a favorable economic environment (*jingji huanjing*), so the government has been very focused on creating conditions, from production to sale, to lead them to choose to plant *rou congrong*, and therefore *suosuo*, as well." In the logic of ecological management that Foreman Zhao describes, modifications in the economic environment can be employed to influence and condition the behaviors of ex-herders who can then be put to work in the modification of the ecological environment. State action aims to instrumentalize the entanglement of these two 'environments.' An economy thus emerges as an environment in which economic practices – and their ecological effects, synergies, and impacts – can be governed.

What does it mean that the economy (*jingji*) has become an economic environment (*jingji huanjing*)? As Lisa Hoffman reminds us, in Chinese, as well as English, 'environment' refers multiply, not simply to non-human nature, but also, more abstractly, to an arrangement of things, a milieu in and out of which things can be made to happen, the set of "conditions that make something possible" (Hoffman 2009:107). The manipulation of these conditions is thus a way of acting on possibility. Rather than a domain that exists in its own right, then, the economy is being in multiple environmentalized, drawn into new articulations with the economic environment, and then, appearing as itself a set of variable conditions through which certain desired outcomes can be made possible.

This chapter explores, through anti-sand ecological programs since 2000, this dual 'environmental' reconception of Alxa's economy within the governmental apparatus that was assembled to reconstruct its deteriorating ecology. In the early 2000s, the political status of the region's pastoral economy underwent a profound shift, when the practices of herding and grazing flocks of sheep and goats, promoted in the two decades of Reform and Opening as an engine of regional economic development, was in the scramble to protect Beijing from long-range dust storms, was suddenly pinpointed as the root cause of desertification. The re-engineering of Alxa's pastoral economy, rendered as out of sync with the conditions of the ecological environment, became the core of forestry and ecological construction programs. The symbiosis of *suosuo* and *rou congrong*, one plant for ecological construction and the other for the orchestration of economic behaviors, as a botanical guide for exploring the attempt to engineer, at a macro-level, a parallel symbiosis between economic and ecological environments.

Second, in a governmental and epistemological shift, the economy loses self-referential political status as merely an object of 'development.' It becomes evident also as itself a kind of environment, the governmental medium through which other things could be governed and changed – human behaviors, the geophysical and botanical profile of desertified pastures. In such a conception of environments, the political subject is not simply an economic agent whose output must be maximized, or a rational actor in a free market. Rather it is something: people who were sensitive and reactive to shifts in these economic environments, and whose behaviors could thus be controlled as responses to environmental conditions and their changes. Following Foucault, this is the template of a political technique in which action "is brought to bear on the rules of the game rather than on the players." An "environmental type of intervention" does not aim at "the internal subjugation of individuals" (Foucault 2008:260), but rather presumes that the behaviors of human individuals are modifiable as an effect of the environments in which they are re-situated. The well-planned environment becomes a mechanism for eliciting desired behavioral responses from ex-herders operating in the interplay of its forces.

Much recent anthropological work on environmental regulation has focused on the political cultivation of environmental subjects from above and below (Singh 2013), "people who care about the environment" (Agrawal 2005:162). In these accounts, the making of environmental subjects is tracked specifically through the creation of the affective and emotional habituses through which would-be destroyers of the environment come to a psychological revolution to 'care' about it, and understand their actions in environmental terms. The creation of 'environmental subjects,' for instance, in Agrawal, has to do with the centering of 'environment' as a cognitive and epistemological thing through which village foresters understand their own labors as 'environmental.' In the ongoing calibration of Alxa's economy *qua* environment, the environmental subject presumed in these economic environments is in no need of such a cognitive awakening, no burgeoning awareness of oneself as an ecological actor. In the form of environmental power at work in Alxa, it is not the formation of subjects that is seen as expedient and necessary to the important works of environmental regulation and forestry, but rather the elicitation, through environmental modification, of desired behaviors. This is a mode of governing that sidesteps the problematic of subjectivity, working to coordinate environmental changes without necessarily having to create caring environmental subjects.

Building new market environments, or more precisely, building markets as environments, became a key tactic in light of grazing bans across Alxa and the Three Norths zone. We consider these environmental interventions in relation to three families and how they have reacted to grazing bans. One family remains on their desertifying pasture land and considers its options in light of the hardships that desertification and increasing restrictions on the pastoral economy have introduced. In the second case, I detail the case of an extended family that has been moving, in waves, to an ecological resettlement village, where forestry-subsidized housing and farming equipment sweetens the pot for whole herding villages considering migration out of the desert. We then return to the Li family's 'groundwork,' where, in light of a state-sustained open market for *rou congrong* roots, the economy itself has become an ecological machine.

Economic Environments

In the early 2000s, a mounting dust storm problem in Beijing drew central attention to the desertified Alxa Plateau a source area for long-range meteorological havoc flowing downwind

toward the Chinese capital. The transformation of Alxa's physical and social landscape, and especially the control of sand exposed by rampant desertification were elevated to national goals in an effort to protect Beijing's important atmosphere, especially in the lead-in to the city's Olympic bid in 2001. In 2000, then-Premier Zhu Rongji toured Alxa and other desertified places in Beijing's dispersed airshed, where he attributed the region's desertification, and Beijing dust storm woes, officially, to a new problem: over-grazing. As opposed to earlier official explanations of desertification which overwhelmingly blamed the backwardness of pastoral peoples and, in Alxa, the region's ethnic Mongolian population (Williams 2002), the rubric of over-grazing located the causes of desertification in the effects of a specific behavior and its purported ecological effects: the overintensive stocking of sheep and goats. Zhu claimed that if desertification could not be controlled, "sooner or later China must move its capital" out of course of the dusty wind. In a slogan-triplet, he argued that in Alxa, government must "Kill goats, protect grass, and protect Beijing" (*sha yang, hu cao, bao Beijing)* (*Renminbao* 2000).

Without realizing the massive culling of the region's stock that he called for, Zhu's visit nonetheless demanded regulation of herding and grazing practices as a way of forestalling further retreat and burial of the sand-holding vegetative cover that was a buffer against dust storms. Controls on grazing were implemented soon thereafter as an emergency ecological measure for the protection of dwindling grasses. In the early 2000s, mandatory partial grazing bans, which ranged from seasonal cessations of open grazing to outright enclosure of heavily degraded pastures, were piloted in heavily desertified parts of the Alxa Plateau and in the immediate outskirts of Bayanhot, the region's main city, and they soon rolled across the Plateau as a durable feature of a new regulatory environment for the control of activity on pastures, now each susceptible to the eco-economic scourge of over-grazing.

Geographer Emily Yeh argues that grazing bans in Chinese state ecological programs represented a form of "green governmentality" that made "local herders visible and accountable for their purportedly degradation-inducing range practices" (Yeh 2005:24), a green alibi for deepening control over the alleged ecologically irrationality of herders. However, in Alxa the introduction of controls on grazing to control 'over-grazing' did not target herders *per se*, an essentialized population, but rather herd*ing*, an economic practice. They must be understood not simply as a means of deepening control over populations and territory, but also as a technique for modifying the economic environment to which 'over-grazing' could be interpreted as an effect. That is, the epistemological reframing of ecological degradation as the result of a specific practice, made the control of specific behaviors – and then the economic conditions that demanded them – rather than the punishment of herders the crux of ecological programs. It was Alxa's extant market and economic environment that entered political problematization as the set of conditions to which practices like over-grazing could be attributed.

The determination of over-grazing as an economic, ecological, and behavioral problem is crucial in understanding the particular ways in which ecological programs configured their task. This departs from a more overtly ideological explanation in which it is cultural backwardness of herding, which is configured as a Mongolian cultural practice (Williams 1996) even though on this Inner Asian frontier of China, its practitioners are decidedly mixed in nationality, or as a proof of the low quality of rural people who have been rendered anachronistic and deficient in the vertigo of Reform and Opening (Anagnost 2004). Over-grazing indicated a problematic practice that must be controlled, but the causes of the problematic practice of over-grazing, for forestry officials, were not located in the failures of individual herders. Rather, they were understood as the behavioral signature of Alxa's Reform era economy, based on rapacious

markets for pastoral products and the ongoing support of a local government pushing economic development. Since decollectivization of collective mega-pastures in the early 1980s, which sparked a round of land reform (*chengbao*) that redistributed pastures into a patchwork of individual family units, local economic development was staked to market for pastoral products, especially the luxuriant wool cashmere.

This particular market and the consistently high price and demand of commodity cashmere was seen to have created an economic environment that induced a rapid increase of herd sizes on much smaller family (versus collective) pastures, and despite the rapid desertification that was its ongoing result. Foreman Zhao of Alxa's forestry bureau, himself the son of herders, explains that the entry of new markets, combined with new economic conditions produced by land reform, during Reform created the economic conditions in which over-grazing was an inevitable result. He understands this as a clear reaction to the market in cashmere. "When people realized how much cashmere could fetch, their herds grew, sometimes by tenfold in just a few years. The government promoted cashmere then, too, because it was a way of achieving local economic development, and so everyone got goats. These goats cause environmental damage (*huanjing pohuai*) because they eat everything, even the roots of grasses, and they use their hooves to break up the ground. But people had no way to not raise (*meifa buyang*) goats because of the high price of their wool." 'Over-grazing' was the inevitable result, and herder responses to the demand for cashmere are offered here in the form of a double negative, something that one cannot not do, an action that is the negation of agency.

This attribution of over-grazing as a practice stoked by a deregulated market in animal products was a story echoed also by herders themselves. Mr. Jin, who in 2011, was deliberating over whether or not to voluntarily give up grazing recalls, "When we saw the price that cashmere was getting, what could we do but raise as many goats as we could? In those years, people used to call cashmere 'soft gold' (*ruan huangjing*) for the price it could fetch on the market. Much, much more than sheep. So for many years we had goats, more every year. This happened during many years of drought, so each year the sand spread." Over-grazing here is not a failure of herders themselves or proof of their irrationality, but rather a demonstration of their responsiveness to the economic environments in which they exist. Desertification, which sapped the economic productivity of pasturelands, becomes a mark of the family's powerlessness under the pressures of a changing economic milieu, rather than an indication of the new economic freedoms in an increasingly 'free' market. Under these conditions, and these freedoms, he narrates his work not as action but as regrettable reaction. "What else could we do?"

In each account, over-grazing is figured as the inevitable response to an economic environment in which one could not not produce cashmere, despite its clear ecological consequences. This action was not one's own, but rather the reaction to an economic environment. That is, for both herders and ecological programs aimed at controlling herding, the phenomenon of over-grazing is interpreted as the inevitable reflex of an economic environment out of sync with ecological conditions.

Importantly, it is not markets in general which are defined as the problem, nor is this attribution of ecological degradation to the market somehow a rejection of marketization as such. Rather, the problem in markets for cashmere is the cashmere itself, whose process of production is revealed as out of sync with Alxa's ecological conditions, as well as the politically uncontrolled-ness of its effects on the economic environment of herders. Indeed, if anything, the attribution of over-grazing to the economic environment created by markets for cashmere, only redoubled a political fascination with the apparent capacity of markets to orchestrate human

behaviors, even against the better judgment of those caught in it. If a market for a commodity could orchestrate human actions through the environment they configured, a controlled and well-managed market for certain commodities, like the medicinal roots that depend on and thus beget sand-stabilizing shrubs, could be deployed in the creation of a new economic environment oriented at eliciting and controlling behaviors filtered for their ecological effects. This presages the later practice of manipulating and tightly controlling commodity markets as a way of organizing human economic behavior.

Where economic development for its own sake has become the basis of the political legitimacy of CCP in Reform, as well as proof of the ongoing viability this status quo, the notion of over-grazing meant that an economic system could be interpreted through its effects on something else: an ecological environment which appeared as a level of reality possessing its own characteristics, and which bore the effects of economic behaviors in the form of 'ecological degradation.' This ecological environment is worlds away from a Maoist conception of the natural environment as a thing that could be subjugated and whose productive capacities could be expanded indefinitely by technological advance and sheer willpower (Shapiro 2001). Rather than one that must be subjugated in order to unlock the potential to infinite economic and material expansion, here, the operation of state power demands the creation of an economic environment appropriate to ecological conditions, and which could be indeed programmed as a machine for ecological construction. This is a shift from an ecology that must be subjugated for economic goals toward an economy that must be calibrated to ecological conditions. And opposed to neoliberal commitments to the freedom and externality of 'the market' from the intrusive meddling of the state (Harvey 2005), in anti-sand forestry and ecological programs, the domain called economy did not indicate a limit to political intervention, but indeed appeared as demanding continual political intervention. The economy, constituted as an economic environment, as a political object *par excellence*.

What is at stake in the designation of 'over-grazing' as a problem to resolved politically is the governmental revelation of the modification of Alxa's economic environment as an efficient means of corralling and directing the human behaviors that would be expedient in the reconstruction of its degraded ecology. If over-grazing was a phenomenon that could be interpreted, politically, as the reaction to a maladjusted economic environment, the re-engineering of this economic environment would become a key means through which new behaviors, with better ecological effects, could be realized. 'Over-grazing' indicated not only that changing economic environments could drive changes in the ecological outcomes of economic behaviors, but also that relations between land, people, animals, and plants could be dissembled and re-assembled continually in relation to economic and market manipulations. The environmentalization of markets and other economic forces in Alxa was thus a way of continually unsettling and re-fixing herders and ex-herders within a shifting ecology of governmental techniques and goals. Ultimately this meant the re-engineering of the pastoral economy into post-grazing economic environments that would engender more acceptable behaviors.

Mandatory partial controls on grazing, piloted in the early 2000s, eventually intensified when it was not simply excessive herding that must be controlled but the economic environment that 'caused' it. If high demand for cashmere drove over-grazing, then the state aimed to dismantle the pastoral economy by dismantling supply, by offering a suite of economic benefits and incentives to herders who elected to participate in voluntary outright bans on herding. In facilitating this dissembling of the conditions of the pastoral economy, one desertified pasture at

a time, local officials were busy creating a new, holistic economic environment. They designed and manipulated it so that, ideally, it could reabsorb herders disenfranchised from their pastures, and through which, their economic efforts could be retooled as engines of the venerable national project of ecological construction to protect Beijing from wayward dusts peeling off the desert edge.

Dissembling Pastoralism, Bankrolling the Environment

Voluntary outright bans on grazing were offered, in the mid-aughts, to herding families on heavily desertified pastures. Compliance with the bans meant that herders would have to sell upwards of 90% of their flocks, keeping only enough sheep or goats to be raised in enclosed pens for family use. In return, they would gain access to a suite of benefits and subsidies that would partially compensate for the loss of their flocks. The decision to comply with bans, for those families who did, was not made lightly, but they must be understood in relationship to the changing ecological conditions and intensifying regulations on the pastoral economy itself. Tighter controls made herding increasingly expensive, in that they required cash inputs for things that were once freely, such as purchased fodder to sustain flocks during seasonal restrictions on open grazing. Controls on grazing to stem desertification were practically redundant with desertification itself, in that both spelled, for many herders, the imminent end of a livelihood in sheep and goats, choked out by ecological degradation and economic pressure. Additionally, a trend toward intensifying mandatory controls on grazing catalyzed many decisions to comply 'voluntarily' with the bans as a way of cutting losses early to gain access to the suite of benefits attached to full bans.

While grazing bans certainly operated to destroy the local pastoral economy by choking out supply, they must be understood productively as a political technology for creating the conditions of an ecologically-adjusted, post-pastoral economic environment. Grazing bans in all but the most heavily desertified places were strictly optional, and so rather than a purely punitive measure, they were offered instead as a way of buying into a complex of state supports and opportunities. The falling productivity of the land and the subtle threat that bans may become mandatory – and thus not linked to current benefits – themselves became part of a new field of choices for herding families.

The bans might be understood, within their logic of their operation, as a complex machine for creating a new economic environment by quickly rendering the existing one impossible. They were a way of transitioning quickly people from one economy to another, from a deregulated economy driven by exorbitantly high prices and demands in cashmere to one in which demand – and thus economic activities – could be tightly controlled by the state. This economic environment must be understood, in the way that it was posed by forestry officials, as a centerpiece and key technique in an integrated work of maintaining social, ecological, and economic stability in a new "socialist ecological civilization" (*shehuizhuyi shengtai wenming*) (see chapter 3). They worked to facilitate the ending of the pastoral economy as the beginning of another. The apparent destruction of the pastoral economy was, in this sense, understood as a disassembling of it into component parts – land, moneys, workers – that, in a post-pastoral economic environment conditioned through intense state intervention, were free to be re-assembled into new economic enterprises. The raft of benefits that they offered thus must be

understood as calculated political interventions designed to facilitate the entry of ex-herders into new economic endeavors with less ecological impact.

Crucially, apart from dissembling the pastoral economy, grazing bans operated as a funding mechanism for bankrolling new economic pursuits. To fund bans, local government assembled existing institutions and programs as sources of cashflow to sustain program budgets, and then disbursed this money to complying herders, in an echo of socialist redistributive institutions. These moneys were assembled from disparate government sources, configuring a topology of existing institutions (Collier 2009) recombined into a streamlined funding circuit. This included moneys from central and local forestry budgets, moneys earmarked for poverty relief (*fupin jin*), and state retirement supports for the elderly (*yanglao jin*). Secretary Bataar, a high-ranking official in local government, explains that recovering sources of cash to give to herders is an important continuation of the state's responsibility to its people. "It is certainly the responsibility of the government to care for people in such difficult situations, and we could not simply abandon after taking away their sources of livelihood – this would lead to social destabilization (*rang shehui bu wending*)." However, these moneys were nonetheless not charity, offered so that ex-herders could live as wards of the local forestry administration so they could "spend their days doing nothing" (*meitian meishi gan*). Culled from government sources, and distributed through a care for the people that echoes the Maoist slogan *Serve the People*, these moneys were offered to be accepted not as welfare but as starting capital, ready to be re-invested in the new economic opportunities opened in the economic environment designed to replace pastoralism.

Moneys released for participation in bans was understood, both by officials and ex-herders, as a literal state investment in the activities of herders after herding. Its redistribution was a bid to kickstart new economic ventures, giving ex-herders the wherewithal to participate in the government's new economy as petty entrepreneurs. Essentially, then, grazing bans were a way of preparing the conditions of a pasto-pastoral economy and ecology as well as bankrolling ex-herders to participate in these new ecologically-harmonized endeavors.

Options

For families deciding whether or not to participate in bans, the decision includes many factors. The bans, for many, raised important questions of how to assemble and imagine an economic future in the midst of ecological devastation but also continuing pressures over planning for retirement and inheritance. Kinship, the land, and retirement planning shaped a landscape of calculations and competing options for family futures. Out of the city, west into the desert and against the wind, the ground shifts on what remains of Bayarmaa's[10] pasture, a huge area she estimates at some 20,000 mu[11]. The pasture is changing, racked by years of drought, and, in the institutional commonsense of Alxa officials, released into a sheet of loosened sands by the herds of grazing sheep and goats that have ballooned like the exponentially increasing demand and prices for meat and cashmere. The market in goats, especially, deregulated since the 1990s,

[10] A pseudonym. She is Mongolian minority, as are many, but not all of the herders in Alxa. Because of migration to the region from droughts in Gansu into the 1960s, many Han settlers also learned and practice herding.

[11] A *mu* is a Chinese unit of spatial measurement, about to 0.067 hectares. A 20,000 *mu* pasture measures more than 1,300 hectares. Compare with family farm plots in other places in Inner Mongolia, which, according to my notes, average about 400 *mu*, or about 26 hectares.

has been driven by consumer shifts in an urban China hungry for a material life that has been the promise and proof of development in Reform China.

Bayarmaa and her husband are Mongolian in nationality, though she speaks to me in Mandarin Chinese with the local accent, her first language. In the twenty years since land reform under Reform and Opening (*chengbao*) has distributed land and a starting flock to her family, she has radically shifted the composition of her flock from sheep to cashmere goats, whose pointed hooves and voracious and indiscriminate appetites have been blamed for driving desertification. She has two adult children, one at university in Hohhot, the regional capital studying law. The other is a daughter at an environmental non-profit in Alxa's main town. She invited me to her family pasture. While the children return for holidays, none of them expect that they will come back to this pasture as herders, even if they could. Both children, educated at live-in schools in the nearest city, have neither the interest or knack for the difficult, solitary life of herding, where in Alxa, the closest neighbor in a drunken 15 kilometer motorcycle ride away.

In the morning, we sit in her kitchen. Her house is new, built in the last five years at the crest of a small hill. Its brick and tile construction is a sign of the moderate prosperity that has reached even this distant pasture, two hours to the small city. At night the wind picks up to a howl that makes the windows groan and spins the two small wind turbines that power the house's lights and television. By the morning, the sand patches that dot the land and bury the grass will have shifted, and the topography of their land, officially classified 'semi-degraded pasture' by provincial forestry officials, will be a patchwork of smothered grasses and mounds of sand, some mobile in the wind, some momentarily anchored in windy shapes by quick-growing pioneer scrub grasses. Each year, Bayarmaa says, the land disappears a little more as the sand shifts and pools over it, creeping up their sides as one topography slowly engulfs another.

The new house overlooks the old one, which is visible from a perch in the soft undulations of the land. When her husband hired a Han man from nearby Ningxia province, he had it built solidly, with bricks and tiles that would stand against the winds, but even so, daily upkeep is a work of perpetual sweeping. The house then was proof of a future whose coming had long been heralded in rumor and the speeches of officials. It marked a stake in the land that had been redistributed to the family after the decollectivization of pastoral brigades, as well as something solid, built of brick (D'Avella2014) that they could pass on to one of their two children as a wedding gift. Two small wind turbines rise on one side the house to catch a perpetual wind in this place off the grid. The first operates the houses lights, and the second was added to later to power a satellite phone and a television that is always on, fighting with the sound of the wind. The house was built at the crest of a hill gently rising out of the broken surface of the pasture.

From the window of the corner bedroom, their old house, all earthen construction, is visible in the long, slight basin in the land. Its corners have been rounded by years of wear. Windblown sand has surrounded it, and gathers in a slope on its windward wall making a ramp for their livestock onto the old house's roof until it blows away again. "There is a saying here, have you heard it? 'Sand climbs walls and sheep climb roofs" (*sha shangqiang, yang shangfang*). The house and its walls become the props of sands that accumulate and dissipateswith the wind. "We stayed there until we couldn't," Bayarmaa says when I ask, as the weather report drones on. "We stayed there until the sand started to bury it." These days, it sits empty, or as a barn where they store fodder for the winter and spring. Building at higher elevation is a bid to keep the new house just a house, against their incorporation into an intermittent architecture in the swirl of the moving landscape.

As desertification intensifies in this corner of Inner Mongolia, so too has the implementation of the local forestry authority's grazing bans in the national Forestry program to "Transform Pastures into Forests and Grasslands." Already these bans tighten on pastures that border the desert, even as they tighten on the yearly cycle of pastoral production. Grazing is not only banned through the long harsh winter, but also through much of the spring in a bid to protect and ensure adequate vegetation for holding the earth in place against the wind. During this time, flocks are raised in pens on fodder that is procured, expensively, from farmers nearer the city or in Ningxia, where grazing has already undergone a full ban. They aim to dismantle the pastoral economy to free up the land to projects that will stabilize it against itself. If Reform and Opening staked development to animals and the economies that their grazing bodies upheld, animals and pastoral life have also become engines of the ecological degradation and physical destabilization of the land, to be controlled and indeed phased out.

These bans, for now, are officially voluntary and are incentivized with a cocktail of government subsidies. They have been implemented unevenly in Alxa, despite the incorporation of the whole region into the central SFA's plans, and are adjusted with the local forestry bureau's evaluation of the relative degradation of different pieces of land. They are implemented most strongly at the immediate borders of the city where former pastures are now a buffer strip of "public forest" (*gongyi lin*) spaces that have been flash frozen into place through intensive aerial seeding and an aggressive planting campaign that forestry officials argue are for protecting the city (*hucheng*). For people whose pastures are already behind the expanding front of the desert, they function as a mechanism of poverty relief (*pinkun*), offering a raft of compensations to people whose land had already failed to be suitable for grazing (chapter 2). But for Bayarmaa and her family, the sands coming from one direction and the bans coming from other other work together to find her family considering a changing landscape of possibilities.

These moving physical and policy geographies squeeze pastures like these into landlocked isthmuses where grazing continues, constricted in space and time. The movement of the desert, smothering the family's wide, scrubby pasture, and the steady disappearance of grasses have made life increasingly unliveable here, and the forestry programs that work to dismantle herding by administrative fiat seem to cooperate to guarantee this end, despite their apparent opposition to each other. However, while in many other parts of China, massive projects of environmental transformation push forth as great engines of dispossession, the effect for her is one of a redundant ending, where grazing bans and desertification signal the coming of the same, multiply determined end. Between the sands and the bans, the future of the family has become precarious, and the house which they built overlooking the burial of their first now contends with a second. The bans are pitted against the sand, but for families on the pasture, they replicate its closures of a future in goats and grass. This sense of an ending here entangles with others. She does not think, for instance, her children, a son at university in the provincial capital, and a daughter working for an office in the county town, will return to this distant pasture to claim and live in this house built with them in mind. And even if they would, what kind of life could they eke out of the sandy earth?

Desertification appears, then, not simply as an ecological process, but a complex of physical, policy, and economic processes, all of which spell, practically, the choking of the pasture. Her family's pastures are in transition, whether by the windy erosions of desertification or the grasslands and forests that are to grow in the ecological breathing space of the grazing bans. Thus, Bayarmaa, to my surprise, supports the bans, even though it means and end to her flock which now numbers 300 strong, well above the 20 or 30 animals they would be allowed to

keep for personal consumption if they were to comply with the bans. While others rail against the bans, for Bayarmaa, they are only the political face of an unavoidable process by which geology and politics each render unproductive their land, so recently redistributed and so recently the substrate of a bright future. In this the destabilized earth has invited new political investments against its movement, a politics of sand control indeed reinforces some of the most pernicious implications of desertification. Because of the sands, the recuperation of the broken land in forestry plans is met with a profound ambivalence, neither a straightforward rejection of an overbearing state, nor a happy acquiescence through which unfortunate locals sacrifice their prospects for a greater national good. The bans are indeed a machine for creating a future against the inorganic machine of desertification, though this is a future without grazing. The transformation of pastures to grasslands and forests is a program of topographical stabilization that nonetheless has made the future unstable, a "detonation in time" (Jain 2013) through which past and future uncouple.

This year, many of the ewes have given birth to twins that dot the degraded pasture. In the late morning, she rides us on her motorcycle, blazing a trough in the sand, which spills in plumes on each side of the tires. She is practiced in navigating the slalom of puckering dunes and ignores the palpable sliding of the tires in the sand, gripping and failing for traction. I am terrified. I hold onto her with one arm, and in the other I grip a plastic bag containing a baby's bottle that we will refill with pouches of the milk I brought from the city. When we crest a hill to find the grazing herd, there it is, some three hundred sheep and cashmere goats, spilling like a wave over what remains of the grass. At night, if they do not make their way back to her house for water and salt, they will find shelter on the leeward side a dune against the winds that rise to a howl. As we arrive, most of the sheep and goats ignore us or part into two grazing flanks, but on hearing the motorcycle, a small flock of tiny goats comes to us, thirsty for milk that we feed them with the bottle. These are the leftovers, the other twin that the ewes refused to nurse. She chides these mother goats as negligent mothers, and each day, she comes specially to feed the baby goats that they ignore. In the flock of animals for market, chewing away at the grasses that hold the land in place, each of these extras has a name: Princeling, Little Yellow, Baobao.

Even as grazing continues, and perhaps it will for a few years, it is shadowed by an end that is viewed by all as a foregone conclusion, by sand or law. Life drags on and even the everyday affairs of the pasture continue, but the life courses in time of these surrogated goats clashes with the projection of the moment in which the bans become total, forcing the sudden sale of the flock at bottom dollar in a buyer's market, created by decree and then flooded with supply. In other years, these extra goats would have been a windfall, a bumper crop on the pasture. The labor of bottle-feeding is a pleasure in communion, but also a small amount of work in the anticipation of their cashmere, which herders here sometimes call 'soft gold.' I ask what she plans to do with them, and she answers with a sigh of anticipatory nostalgia, as if they are already gone. "Sell them off, before the winter. Or maybe in the spring, after we shear the cashmere."

Bayarmaa spins hypotheticals. For as the physical environment changes, the family finds itself in a new policy and economic environment that has offered a set of choices that they weigh against each other and plot out in relationship to the timelines of their retirements, the weddings of their children – should they ever come -, and the anticipation and speculation over tightening restrictions. In the city there is new real estate, offered at heavy discount for those who give up herding voluntarily, and she muses on what it would take to acquire a flat for her son and his future wife. They could, she imagines, keep the flock and collect the subsidies like some of her

neighbors, who abscond their herds behind the dunes when the forestry police make their rounds, simultaneously accommodating and dissimulating (Scott 1985) the new status of Alxa's pastures as sites to be transformed into grass- and forestry planting zones. Since grazing bans, as an ecological measure, only control open grazing, they could maintain their flock if they kept them in a large corral and fed them with purchased fodder rather than allowing them to roam the pasture. They could sell the flock to pay for an apartment in the city, which at 100,000 is tiny by Chinese standards but, she bristles, "crowded beyond belief" for people accustomed to the wide expanse of the pasture-desert.

Resettlements

Mr. and Mrs. Xu live in a compound at the very far corner of Little Reservoir Village, just outside Alxa's main city. When they arrived four years ago as the first family to resettle here from their home village, a place they now refer to as "in the sands" (*shazi li*), the building, like the many others in the neat rows and files of the village, was a Spartan brick structure, two buildings flanking a small courtyard. In one building, Mr. and Mrs. Xu keep two bedrooms for themselves and their two adult sons, as well as an indoor kitchen and bathroom, all tiled with the help of friends and neighbors. In the other, they store farm tools in a small storehouse adjoining the room where Mrs. Xu's elderly parents live.

Little Reservoir Village has long existed as a settlement just outside Alxa's main city, but in 2006, the local government, funded by central forestry moneys, began rapidly expanding the town, laying out a new grid and then building not only dozens of small houses but also dozens of greenhouse-like earthen enclosures, 'warm tents' (*wenpeng*) for contained farming. This began as part of an experiment in drawing people out of the desert as grazing bans and ecological controls ramped up across the region and then switched into a full-fledged strategy for incentivizing voluntary resettlement. The village was slated as a resettlement (*anzhi*) area for two whole villages hundreds of kilometers into the desert. In anticipation, 'local' offices for the two towns were established in the village's new government administration building to administer government services within China's *hukou* household registration system.

This, like other resettlement villages, is part of a rapid changing real estate environment in and around Alxa's main city, where access to cheap and often free housing, and then starting capital and equipment for a tightly controlled set of new economic activities has been a key way of moving people out of their pastures. Families like the Xus opting into bans and voluntarily resettling in Little Reservoir Village gained free access to homes – although a legal decision over ownership status was deferred – and also to as many greenhouses that they could plant. Many of the homes come equipped with small stables and some families have converted their courtyards to small pens where they raise sheep and milk cows. In the village, the regional government has consolidated government services, so that collecting benefits and forestry payments is simple and convenient. Every few weeks, the entire village is gathered in the square to participate in government-sponsored entertainment featuring dance troupes, singers, and public educational events about forestry benefits that they can apply for as voluntary resettlers.

Where ecological resettlement in China is usually discussed as a forced refugee-ism from the areas ravaged by state megaprojects like the Three Gorges Dam, here, resettlement is part of a state re-engineering of life possibilities for herders in an attempt to modulate their patterns of settlement and their economic practices. The Xus, themselves Han descendants of migrants

fleeing drought and ecological degradation in Gansu province during the Great Leap Forward, have practiced herding for decades, learning from their new Mongolian neighbors on this side of the Inner Mongolian border. When they arrived in Little Reservoir Village, they learned, through an agricultural trainer hired through pooled village funds, how to grow vegetables in the state-provided greenhouses, and then how to participate in vegetable wholesale markets for Alxa.

Mr. Xu, as one of the earliest arrivals, has become a spokesperson to his old village for the benefits of out-migration and resettlement. Having thrown himself into the work of making a new home out of the sands, he offers himself as a model and success story, and when I ask, he systematically lists off the hardships of life in the sand with the many benefits of living near the city. "Life in the sand was full of dangers and the infrastructure for everything was poor," he remembers. "The roads were bad, it was difficult to travel. There was no information [cellular phone access] in such a remote place. It was far from markets and it was difficult to bring animals out." He poses the problem not simply in terms of the difficulties of living, but indeed as a matter of life and death. "If something happened to you there, you'd never be able to get someone to a hospital. It was impossible to use cellular phones, and even if you did get access, it would take an hour before a car could arrive and another two before you could get to a hospital. So it was almost like a death sentence living there."

In the village, he states, all of these things are easier, and because the government wants to attract more people, they give people as many resources as they can. He says that at one point he and his wife were planting four greenhouses of *shacong* sand scallions, a local specialty vegetable that fetched a high price at market, where it is a staple in the restaurants, also operated by ex-herders, that cater to Alxa's burgeoning desert adventure tourism market. He continually describes the economy created *by* anti-desertification policies as a site of hard work but many new opportunities compared to the life in the desert. He shows me photos of his old life, and when he reaches the one on the day of his move, with a truck piled high with future, he reflects on how his life has improved since he was the first to leave. Today, much of his village has followed him.

In the summertime, when I live in the bedroom for the Xus' sons, we spend our days working on the vegetable plots and then doing home improvement and repairs on the empty house adjacent to his. His sons now drive water trucks for forestry programs like many other young men in the region thirsty for travel and the chance to leave the sands. Mr. Xu, as one of the earliest arrivals from his town to the resettlement village, arranged early on that several of the neighboring houses be held empty for his extended family. As an outspoken booster for resettlement, he also gained the political capital to plan to move his brothers and his wife's siblings from their home village into choice plots, so that all together, the multiple houses will comprise a quasi-compound.

When I ask whether they are ecological refugees, Mr. Xu says no, they are refugees from poverty. Forestry officials understand projects like the resettlement village as a way of moving people out of prospective anti-sand forestry zones, and establishing vegetable markets and growing tourism in the region is a way of replacing their incomes while also keeping them occupied. For ex-herders considering resettlement, however, it is understood as a difficult but ultimately hopeful reaction to changing economic conditions in the face of a depleted herding economy.

Groundwork

Last, we return to herders who decide to convert their lands from pastures to *rou congrong* plantations. Since *rou congrong* depends, botanically, on the microenvironment created by the sand-binding shrub *suosuo*, *rou congrong* planting is in effect also forestry work. Growing these medicinal roots demands, first, the planting of *suosuo* as a botanical infrastructure for holding the sand, which, in effect if not exactly intention, finds Mr. Li's family and ex-herding families like it busily accomplishing forestry administration planting goals while they prepare their land for a new economy. Their land and their labor is doubled: for local officials, it is a forest of wind-breaking shrubs, a biological infrastructure against dust storms and the problematic mobilities of blown sand. For Mr. Li and other ex-herders, the *suosuo* forest enables their participation in a waiting economy for *rou congrong*. *Suosuo* forests are the botanical machinery of a living factory for more valuable roots growing out of sand.

Preparation for participation in a new economy thus demands the ecological preparation of the land. If *rou congrong* cultivation depends on an infrastructure of shrubs as their prerequisite micro-environment, conversely, the planting of these shrubs requires a market for the valuable roots. Planting the sand-binding shrub is thus a kind of groundwork, not simply in the sense of a preparatory labor, a prelude to the actual work, but also in a second more literal way, in the sense of an action on the shifty earth and its properties. To Mr. Li's family and many others for whom compliance in grazing bans has opened access to a suite of benefits, participation in the eco-economic coupling of *suosuo-rou congrong* cultivation re-opens their land to economic possibilities, the prospect of a livelihood after grazing has ceased. Local government aims to leverage this botanical symbiosis, which binds the sand in the process of making it profitable, by creating the market demand that will compel ex-herder families like the Li's to grow *rou congrong*, and in the process, the forests of sand-binding shrubs they require. The entanglement of roots in the sand thus models a political technique that binds economic and ecological changes in the venerable task of ecological construction that will protect distant, downwind Beijing from dust storms lifted off these exposed dunes.

Planting of the shrubs as a forestry goal has become politically inseparable from creating markets for the roots that grow through them. The shrubs, the botanical prerequisite of the medicinal root, are increasingly reframed as their anterior reflex, a groundwork for participation in a state-planned economy engineered to engender the coupled plantings that will hold the earth, finally, to itself.

Figures 11 and 12: *roucongrong* growing in *suosuo* roots.

This environmental type of intervention, I suggest, is key to understanding how 'environment' doubles from an object of power into a technique of governing. Ecology and economy become parallel and complexly entangled environments whose variables are open to modification. I show how local forestry administration projects aim to manipulate subsidy, market, and commodity environments in order to dismantle the 'ecologically irrational' pastoral economy on the desert's edge, building post-pastoral economic enviroments to reincorporate herders into a new ecological governmental apparatus in which their behaviors and effects could be harnessed to sate ecological ends. Engineering a proper economic environment – that is, engineering the economy *qua* manipulable environment – becomes a moment in the gathering of the pieces of the pastoral economy into the apparatus through which the ecology of the desert's

edge would be reconstructed. And where this becoming-environmental power centers on the elicitation of responses through arrangements of environmental variables, it contends with the possibility of a failure of properly induced response, flowing from a 'response-ability,' a "capacity for response" that pries open a space "where what is to come is not yet," "and might still be otherwise." (Haraway 2010).

Supply Chain Ecologies, Economic Niches

Grazing bans created new economic starting conditions for ex-herders to participate in new ventures – the extrication of pasturelands from the pastoral economy and the funding of ex-herders. The release of ex-herders, with government cash, into an uncontrolled economic environment, however, offered no guarantees that if, left to their own devices, they would not squander this money or use it for purposes at odds with state ecological construction goals. Thus, it was important that as herders were disentangled from herding, there was an attractive economic environment ready to absorb disenfranchised ex-herders as participants. If the pastoral economy was dismantled by eliminating the supply of pastoral products through grazing bans, the economy that would replace it, and the environment that would reintegrate herders, was based on the propping of an artificial supply for *rou congrong* roots and the products of other sand enterprises (*sha chanye*). Alongside the artificially sustained demand in *rou congrong*, state investment of monetary and political resources made available by anti-desertification forestry in new endeavors that would people out of the desert and resettle them in new economic behaviors that would decrease their putative impact of the ground surface. Investments in tourism, which created new demand for vegetables, and in real estate, which created a demand for a service economy, were attempts to create the economic conditions for a new ecology. Where grazing bans created the conditions of new economic endeavors for ex-herders, the creation of new markets was necessary for their immediate reabsorption in an economic milieu, amenable to state modification, which was attractive enough to draw ex-herders into the play of its forces.

Generating artificial demand, and therefore a guaranteed buyer which would eliminate economic risk from ex-herder decision-making, was understood by forestry officials as the necessary closure of an economic loop, making the pathway from grazing bans to medicinal herb production an easy alternative for ex-herders. Where grazing bans configured starting conditions, the creation of demand for medicinal roots, for instance, promised ready buyers on which ex-herders could rely. This demand was artificially created and held together by political intervention in order to facilitate the quick channeling of ex-herders into waiting markets that had been assembled by the local government.

Foucault's discussion of 'environmental technologies, associated with what he calls "American neo-liberalism" (Foucault 2008:259) is a helpful way of framing this capacity of an economic environment to elicit behavioral responses. In his reading of a proposed measure to control drug use in the US War on Drugs based on liberal economics, the template of an environmental type of intervention is the artificial manipulation of drug prices as a way of manipulating the market milieu in which drug users operate. Prices were kept artificially high for new users who might yet be dissuaded by high initial cost, and they were tamped artificially low for habitual users so they will not commit criminal acts to secure cash for expensive drugs. Environmental intervention, he suggests, acts indirectly to efficiently condition behaviors. It acts

"on the market milieu in which the individual makes his supply of crime and encounters a positive or negative demand" (2008:259).

Using markets and payouts were ways of conditioning an economic environment that could compel ex-herder participation, as if by the unlocking of an attractive force in the proper configuration of elements and environmental forces. In Alxa, stoking an inelastic demand for medicinal roots aimed to create a stable and guaranteed final buyer for roots, taking the volatility of markets out of the picture. This was accomplished through intense political intervention in assembling a market in the region. First, local officials worked to attract buyers and companies from outside of Alxa to set up processing centers in the region in order to create a waiting market the root which would in turn spur the growing of more *rou congrong*, and therefore the planting of more and more *suosuo* to the benefit of the forestry bureau and ecological construction programs more generally. They did this essentially by manipulating the tax and policy environment for *rou congrong* buyers, effectively lowering the hurdles and operating costs for companies that would pledge to buy future *rou congrong* grown in the region. In effect, for forestry goals, local officials practically rezoned Alxa as a tiny and highly controlled special economic zone (Ong 2006) specifically geared to attract and capture enterprises that would anchor demand for *rou congrong*, even before a critical mass of producers in the region existed.

In this way, as buyers set up shop in the region, officials were piecing together a low-risk market environment for herders who might yet become *rou congrong* producers and planters of the sand-binding shrubs that the valuable root required. Against the volatility of markets in pastoral products like cashmere, and against the shifty dissolution of sandy pastures, this stability in root demand propped up by the local government appears as an attractive proposition, a lure that instills a value that is not monetary but still economic – the political promise of an inelastic and inexhaustible demand for the product. It is thus not simply the lucrativeness of the product but the durability of demand for it that drives the gravitation of herders in this economic environment.

Where grazing bans and payouts creating the conditions through which herders could pursue post-pastoral economic endeavors, the state manipulation of economic conditions to guarantee demand provided an immediate alternative for ex-herders. The readymade economic environment, anchored by guaranteed buyers for a product not yet produced, thus functioned as a way of rapidly absorbing ex-herders in new economic endeavors. It was the proper arrangement of economic variables that was understood to facilitate and compel ex-herders to use state-provided investment capital, as if acted upon directly by market demand. They constituted ex-herders as economic subjects that could be drawn into properly calibrated economic environments through the proper cocktail of incentives, guarantees, and opportunities. As the pastoral economy was dissembled, land and herders could be readily reabsorbed into waiting economic conditions, prepared by local government precisely for this purpose.

The promise of a waiting buyer guaranteed by political manipulation of market conditions indeed set up the economic environment for *rou congrong* cultivation as a supply chain with buyer but no sellers. Becoming a producer of the root was to occupy a structural position in a commodity chain presumed by buyers waiting for an as yet unproduced product. State intervention aimed at every point to expunge the risks usually associated with market enterprises, especially through the artificial creation of an open and inelastic demand. An economy with guaranteed buyers meant that the phenomena of over-supply, fluctuations in supply and demand, and even economic competition were filtered out. A supply chain complete

with guaranteed buyers has the luxury of being voluminous; where more production does not mean falling prices, there can never be enough producers.

For the political goal of spurring producers is *not* economic development but an ongoing program of ecological construction tacked to the orchestration of ex-herder economic activities. This is an economic environment where the laws of supply and demand can be broken through the action of the state, designed to facilitate constantly increasing production as the mechanism through which the earth is stabilized through the roots of economical value-less shrubs. The economic environment created through state manipulation thus lures with its politically-sustained incompletion, drawing ex-herders into the cultivation of shrubs and roots to occupy a niche in an economic ecology that is never full, a supply chain that is complete but for the suppliers.

Elicited Response, Response-ability

The creation of a highly artificial economic environment, bankrolled through the cobbling together of state moneys and driven by a demand held open by state intervention was posed as a means of orchestrating ex-herder behaviors. These interventions aimed to leverage the capacities of markets and other economic phenomena as tools for directing economic behaviors that would double as vehicles of desired ecological construction. At the center of this is an idiosyncratic vision of the political subject that environmental techniques presume. This is an environmental subject that is quite different from the political subject of certain brands of environmentalism, for whom coming to 'environmental awareness' unlocks ecological change. Certainly, any sense that there was a need to foster a care or consciousness of one's actions vis-à-vis 'the environment' was absent or incidental in any of these re-engineerings of the economic environment in service of ecological construction.

In the case of anti-sand programs in Alxa, the environmental subject presumed by these techniques is one whose behaviors could be anticipated and elicited as *responses* to modifications to a milieu. It is necessary to foreground 'behaviors' and 'responses' as the politically expedient features of this figuration of environmental subjectivity. Foucault argues that in a becoming-environmental of power (Massumi 2009), that the individual governable through action on its environment "is sensitive to modifications in the variables of the environment and which *responds to* them in a non-random way, in a systematic way" (2008:269, italics added). The governability of this environmental subject inheres in its responsiveness to changed in its environmental conditions. That is, from the perspective of an environmental technology, the actions of environmental subjects can be interpreted as responses to environmental conditions. In Alxa, *behavior* was the important level of response because behaviors could be coordinated for their effects on a physical environment. For instance, the means of converting ex-herders into *de facto* forestry workers through the dual planting of *suosuo* and *rou congrong* did not have to do with instilling or fostering a desire to do good ecological work or even a desire to plant. Rather, the creation of an economic environment that incentivized *rou congrong* production was aimed at eliciting a specific behavioral reaction, planting, without reference to subjectivity.

We return to Mr. Li, the ex-herder *cum rou congrong* cultivator whose story opens this chapter. We ride together across his dunescape in his dusty jeep, racing up and careening down the slopes of the high dunes on his land until we perch precariously on impromptu promontory

overlooking his family's land. As we survey the slow-moving teams of planters and the trundling water truck moving between the freshly planted rows of *suosuo*, he explains his business plan.

Two years ago, in 2009 his family, facing the dual economic pressures of desertification and the controls on grazing implemented to control it, decided to comply with full state bans on grazing, selling 90% of their flock in exchange for access to a suite of government programs and payouts. For his family's voluntary participation in grazing bans, he receives a yearly sum from Alxa's forestry administration, as well as supplementary 'poverty relief' funds for each person whose household registration (*hukou*) is logged on the family's land. Though his two adults sons live off-pasture, both of them truck drivers who haul water and materials to other planting sites, he continues to claim their registration in order to collect the moneys allotted to them.

"The forestry administration (*linyeju*) has lots of money from the central government that they give to people like us to plant *suosuo*. This defrays a portion of the cost for us, even though hiring all these people and buying the water is still very expensive. The local government gives us some, too." He pools these funds, disbursed by Alxa's forestry administration and other offices of the local government, together with a portion of the family's savings, loans from relatives, and additional subsidies for planting *suosuo*.

In this gathering of moneys, he accepts state forestry payouts and poverty relief funds as a stream of cashflow among others, which he uses a pool of starting capital to hire labor, equipment, and water to plant *suosuo*, which, when it establishes, will make this part of his ex-pasture into a biotic factory for *rou congrong*. He sees forestry subsidies and post-socialist redistributive programs as undifferentiated sources of state money, which he uses as a seed fund. These moneys will also sustain his family in the two years that *suosuo* requires before it can be inter-planted with the medicinal root, tiding them through this initial period of groundwork. It pays also for ongoing materials and costs of the maintenance of delicate saplings in the important years before they are fully established. Forestry subsidies enable this necessary waiting, allowing the family to weather the long two years during which the *suosuo* will do its work, effecting ecological transformation that prepares the ex-pasture for its entry into a new economy.

"This year, when the first *suosuo* planting from two years ago has grown large and deep enough, we will begin the planting of *rou congrong*," he says, interlacing his fingers to demonstrate the interlacing of the root structures of two plants, the one growing through the other. The timing is right, he assures me, noting the medicinal herb companies that the local government has partnered with to set up shop in Alxa. Cutting to the chase, he explains that among other things, these companies are a state-supported guaranteed buyer for his roots, which makes his partially subsidized bid to grow *rou congrong* a difficult, but very low risk investment. The market that awaits his product in this way conditions his decision to produce it. "When *rou congrong* is ready, there are processing centers (*jiagongchang*) in town we will sell to. They will buy as much as we can grow." Proceeds from sales will roll back into his *suosuo* planting fund so he can expand production, setting in motion the ex-pasture as a self-sustaining machine of step-by-step ecological and economic change. More *suosuo* means more potential *rou congrong*, which, in the state-guaranteed purpose-built market for roots, means more income. Spinning sand into gold.

Curiously, the ecological environment is both central and strangely absent in his plans. While he describes his land in the midst of an ecological transformation, this is continually reframed as practice of economic preparation, a technical prerequisite for participation in the market in medicinal roots. Animated by a market in which demand for roots was propped open by political intervention, planting sand-binding plants takes on a distinctly economic character,

better grasped through budgetary than biological considerations. Instead, his story of ecological transformation is subsumed in a story of navigating through, being a player in, a new economic game, where subsidies become seed money and shrubs become a means of production.

But in any case the environment has 'worked' –in Mr. Li's plans the ex-pasture is slated to become, with each season, an ever-expanding forestry zone. As he busily participates in the economic environment engineered to make ex-herders grow medicinal roots, he has coordinated the planting of shrub forest against dust storms. Variables in this 'environment' are available to perpetual strategic adjustment to elicit and activate an efficacy the propensity of elements and in the fact of arrangement itself (Jullien 1995). Effective configuration of elements in the economic environment in which human behaviors are epistemologically re-situated is a way of unlocking proper, controlled behavioral responses, which in this case can be adjusted to specific ecological ends. Mr. Li's participation in the *rou congrong* economy has been engineered into the economic environment as the anticipated response to well-calibrated arrangements of economic things and forces.

Poised between two figures - a subject who pursues economic benefit, and a subject who responds to environmental conditions - it may appear that the subject presumed by these modifications and interventions of an economic environment is, quite simply, an economic agent enthralled in the pursuit of individual benefit. I caution against this reading for two reasons. First, because it is consistent with a narrative of Reform China in which it has become a parodic neoliberal society, powered only by cynical materialistic and economistic drives (Liu 2009).

But secondly, and more germane to the current discussion, is that environmental technique work at the elicitation of responses, such that even the activation of entrepreneurial agency can be registered as a response to specific environmental conditions. A crucial difference in economy and environment then, is this: where the economic agent acts, the environmental subject is configured as only ever having the capacity to *respond*. Or rather, in the framework of a technique directed at the control of behaviors through an economic environment, the environmental subject is one whose actions are always interpreted as a response to environmental conditions, and the environment is engineered such a way as to activate economic agency as a response. When an environmental subject, so posed, acts, these acts are not a self-originating assertion of agency, but rather a confirmation of the efficacy of the conditions in which it is embedded.

In this sense, an environmental technique presumes the disarticulation of an action and its author. If an environmental subject acts, it is as the response to an authorship that inheres in the impersonality of its environment and the efficacies of the arrangement of its variables. Authorship here is a motive force that emerges in the economic environment itself, and in the political actors who have the authority and capacity to modify it. Crucial to the many explanations of ecological degradation in Alxa, and then to the programs to retrofit them, is that the environmental subject at stake in these techniques is one whose never acts *per se* but who is seen as only ever responding, quasi-mechanically, to the changing conditions of its environment, in the format of a response to an introduced stimulus.

Conclusion

In this chapter, I have explored how in anti-sand ecological construction programs in western Inner Mongolia, China, the matter of 'environment' reoriented the political problem of

the region's economy. As desertification was attributed to the phenomenon of over-grazing, which was then attributed to the pastoral economy, the re-engineering of Alxa's economy became a key technique for re-engineering its ecology. But additionally, the economy became open to manipulation as an economic environment, through which human behaviors could be manipulated as responses to artificially introduced modifications at the level of their environment.

'Environment' is thus not merely a political problem, but a political technique in China. Part of the project in this chapter has to been the description of how such an environmental technique operates and how it incites a shift in understanding of certain well-established categories of analysis: economy, agency, subjectivity. But more broadly, I have offered it as how the introduction of environment as a political problem might also force an experimentation with the political forms as well as with the forms of political analysis. In this, the 'environment' in 'environmental politics' would not merely name a specialized province in an otherwise unreconstructed account of politics, but indeed would be a site for exploring a proliferation of mutations in how we study politics.

Section II

Mid-Stream: Space-Times at World's End

Sand in motion is an interruption into the times and spaces through which sovereignty operates, quite literally grounded in the fixities of territory and in the unity of national time. As dust storms draw places into the time and space of a suspended meteorological phenomenon, in other places, the advance of encroaching sand reorganizes lived time in a waiting. At the edges of deserts, sand's advance is a measure of time and space, as though the earth itself has become an hourglass, pouring slowly and relentlessly toward its own end. In their various modalities of movement, mobile landscapes do not simply signal physical, geomorphological, and meteorological ways of reckoning time and space that run against the various progresses and futures that have become central to the promises and legitimacies of the contemporary Chinese state. They also provide an urgent material repertoire of resources through which the relations between presents and futures can be narrated; environments yield many metahistorical possibilities (White 1973). They organize a politics of spaces into also a chronopolitics, with environmental processes drawn into and reorganizing political ones.

Today, it is not only the open futures of the state that environmental processes challenge. It is also that the end of the world as we know has become a startling fashionable and ubiquitous possibility. Fredric Jameson writes famously, "Someone once said that it is easier to imagine the end of the world than it is to imagine the end of capitalism." To this reported speech, he adds, "We can now revise that and witness the attempt to imagine capitalism by way of imagining the end of the world" (2003:76). In debates over the passing between two geostratigraphic stages, the Holocene to Anthropocene, a curiously anthropocentric conception of environment has emerged to spell the end of natural time. In its defilement by human emissions, the nature of nature has changed. Contra Jameson, for this new alignment of environment against nature, the end of the world has become all too possible to imagine. Environment has become the name of a self-cancelling process.

In China, environmental problems at a local and planetary scale have driven a more general attempt to theorize a 'socialist ecological civilization' (*shehuizhuyi shengtai wenming*) as the next stage in the historical progression of socialism with Chinese characteristics (Pan 2007). Ex-minister of the environment Pan Yue contends that it is only in China, as the last powerful socialist country, that the contradictions of society and the natural world can be resolved. China, the engine of planetary ecological collapse, in his account, is to become the exemplar of a socialism to come, one on which the planetary can be extended indefinitely. His theorization makes ecological endurance synonymous with the endurance of the Chinese state and its peculiar brand of socialism. But in sands, dusts, and particulates –various ways in which lands phase into motion, environmental time proliferates and points in different directions all at once. If in some moments, sands can organize a politics against environmental time – as in the tree-walls and windbreaks that seek to forestall their advance – in others, sands appear as a moment in a process of ecological renewal.

Devastation and disorder can appear as the starting moments of a process of rehabilitation and repair. That is, "this condition of perpetual disorder" can "both def[y] and invit[e] state intervention. If specific forms of statehood are very dynamic historically, in time, discourses on failure and inefficiency are perhaps among the few coherent constructs in a landscape of

otherwise historically unstable political forms" (Ssorin-Chaikhov 2003:7). A statehood facing the movements of the environment exists at the intersection and reorientation of environmental, practical, and political timelines of intervention, a conjuncture that generates political conceptions of the future that are shot through which accounts of environmental change. The motions of sands are both a way of imagining the failure and the deferral of the futures that ecological construction in China depend on.

In the following chapters, we follow sands in motion to sites downwind from the dust source areas that have become a first line of defense in a national infrastructure against dust storms. In chapter 3, we explore several ways in which desertification has become a way of experiencing time in various sandy sites, and then consider how sand has become a material through which various futures are emplotted. If desertification engenders multiple space-times, these not only present material-semiotic possibilities for thinking futures alternate and adjacent to the grand developmental narratives of contemporary Chinese political life. They also become new political objects and the template of new techniques through which anti-desertification can be imagined as a political process. Questions of infrastructure emerge again here, now as interventions into the time and space of a multi-faceted ecological problem.

Where the oscillation and multiplicity of political environmental speeds concerns us in chapter 3, in chapter 4, we follow the dusts to Beijing, the center of the political meteorological zone. Downwind meteorological insecurity and upwind ecological construction speak to the unequal spatialization of power out of which some points in the dust are to be protected through the transformation of others. For their capacity to become an atmospheric suspension that reveals long-distance geographical relations, airborne dusts passing over the capital distribute into and also underscore an urban pollution problem that has become not only an embarrassment for the Chinese government abroad, but an increasingly pressing problem for denizens of the city itself. While elsewhere in the geography of desertification, habitation and politics orient toward the slow encroachment of sand into the very conditions of life, in Beijing, they are oriented toward dust hanging in the air, and eventually in its lungs. Dealing with dust and particulate matter once it has entered into the atmosphere has seen not only the emergence of new forms of urban political embodiment and subjectivity, but has seen a more general re-imagination and re-building of the city in a proliferation of protected airspaces. While the dust hangs in the air, the city emerges as an island in the wind, retreating more and more into contained and conditioned air.

Chapter 3: Slow Futures: Sand-Time and Succession

A Line in the Sand

"If there is a material, technological, and industrial pollution, which exposes weather to conceivable risks, then there is also a second pollution, invisible, which puts time in danger, a cultural pollution that we have inflicted on long-term thoughts, those guardians of the earth, of humanity, and of things themselves."

-Michel Serres, 1995:31

"In the blockading craze that now accompanies every movement of any size, we cannot help but read a reversal of our relation to time. We look toward the future in the same way Walter Benjamin's Angel of History looked toward the past…The time that's passing is longer seen as anything but a slow progression towards an end that will ikely be horrendous…So every attempt to block the global system, every movement, every revolt, every uprising should be seen as a vertical attempt to *stop time*, delay the catastrophe and begin to branch off in a less fatal direction."

-The Invisible Committee, 2014:94.

Leave the Silk Road outpost Wuwei in Gansu province toward the desert, until all roads end in a two lane highway extending northeast over the horizon toward Inner Mongolia, before they run aground in a high carpet of sand. On either side of this highway, past the massive reservoir built in the 1950s to supply this oasis already running dry, there are walls of poplar trees running parallel and perpendicular to the road as a sandbreak, past which the sands of two deserts have already advanced (figure). These sands make this highway into an isthmus between two tides of sand and they make Minqin County, at the road's end, a sudden island, pressed and surrounded on all sides by expanding deserts. These two deserts, pushing through settlements and over fields, have made the existence of Minqin precarious – its 'oasis' has become a last bulwark against the merger of the two deserts into a single unbroken field of dunes. High places become promontories from which to look over a landscape in slow motion, the site of a coming burial in sand.

But from road-level, like so many places drawn into desertification and then into anti-desertification forestry programs in China, there are trees. They grow in rows, quick-growing poplar or pine, which flank the road that connects the county to the rest of the country past the sands. Trees and bushes are planted in a grid that extends from each side of roads in sandy places to protect the infrastructures that make habitation possible in these places, holding open the roads and rails that link them critically to other places. When trees are impractical, there are grids of 'grass squares' (*cao fangge*), built directly onto the sand to stabilize dunes by fraying the wind at their surface, or fields of sand locked into place by sand-binding petrochemicals. Seeds of grasses and shrubs airdropped from the sky establish in mounded patches, stabilized bubbles of earth around which the sand still blows away. These are infrastructural means, biological, physical, and chemical, for holding the earth back. They are raised as the arboreal walls of a levee to contain the flowing of sand, or they grasp to lock it steady, in the tacky stickiness of the "chemical method" sprayed onto the ground.

A wall of trees, a living and often dying living barrier against the sand, exists at the intersection of many temporalities. In the first instance, a tree is a life cycle, moving definitely from one stage to another, structuring and structured by conditions of its environment. In the terms of systems ecology, a tree is a point and perhaps an endpoint in a diachronic ecological process, and it can be a cypher for reading time into an environment. The historical footprints of receding glaciers, for instance, can be read in the species that populate a region. Species can become forensic. They become exemplars of a moment in the succession of a post-disturbance ecology, their presence and spatialization noting an absence. But crucially, the mix of species in an environment becomes a key for unlocking a landscape in time – what exists is temporary and so the life of particular species indicates their coming replacement in the grind of an ecological process. A tree, or a shrub, or a moss becomes a slice in a relentlessly proceeding time, one that may end in the stability of a climax or rearrange endlessly in an "ecology of chaos" (Worster 1990), a shifting mosaic of species.

Such walls of trees now slice across Inner Mongolia, demarcating degraded grasslands into orderly squares on a massive grid, or facing the edge of expanding deserts. While trees, and the spatial logic of fixity and order in space that they suggest have been crucial in the raging of a state-led "topomorphic revolution" in Inner Mongolia and elsewhere (Williams 1996), it may also be that they are the expression also of a chronopolitical logic. Where desertification has changed the land into a speed, walls of trees do not simply aim to reimpose spatial order on a fluid sand surface, but indeed to stop time, delay a catastrophe with intense temporal coordinated.

The various ways in which sand can be read into motion shape a range of chronopolitical interventions into the physical environment of desertified places and places downwind. And the mobilization of ecological sciences in desertification engineering as techniques of geophysical stabilization assemble the future through the convergence and re-uptake of many disparate temporalities in an emergent topology of knowledges, material processes, and political techniques and logics. By describing two ways in which anti-desertification science and engineering interventions can be figured as political interventions against the peculiar temporality of sand in motion, this chapter considers desertification, and environment as a political problem more broadly, as the site of an array of Chinese state experiments in chronopolitics.

In the first, I explore how political narration of Minqin County's desertification has rendered it as what I call a 'negative exemplar,' its possible future burial given as a cautionary example of an environmental fate that has befallen other places and threatens to do so again in the future. In the second, I consider how desertification scientists read dunes between geophysical and ecological processes. I suggest that where scientists see a landscape in various stages of succession, ecology is both a way of interpreting the earth in time and also a way of imagining its renovation into multiple entangled forms of stability. Where sands are a measure of a coming catastrophe, envisioned in the lines that mark its advance, they can also become the material basis for novel figurations of eco-political endurance.

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Sands of Time

From a pavilion on Hongyashan Hill, Minqin County is visible as an island between two deserts. The city and its buried hinterlands are visible in the distance, specks against the enormity of these deserts that extend beyond each horizon. This vista has become iconic of Minqin in particular and of desertification in China more generally; it has become a picturesque stock framing through which the problem of deserts in China is circulated. It is this view through which Minqin is narrated as the site of a coming disappearance, the site of a quiet future disaster. Minqin is haunted by its future. Sitting at "the throat of the Badain Jaran and Tengger Deserts" (*Zhengjiu Minqin* 2005) Minqin is a place running out of time.

Already the county is marked by a series of sites that chronicle, for visiting officials, the ravages of desertification, modeling in the sandswept countryside a devastation that will soon arrive in the county town at the oasis's center. Movement through Minqin for officials – and researchers – comes to take a conventional character, in that there is a trajectory of places that have become key places for experiencing Minqin's desertification. This path has become almost touristic, at each point narrated by placards, slogans, and monuments that mark what used to be here before it was a desert. Signs announce that we are in ecological protection zones or forestry project areas, noting how the landscape has changed and feebly attempting to install the image of a future landscape in its place. The desertification tour of the county, which I go on with my friend the ecologist from Lanzhou and a forestry bureaucrat retired to become a taxi driver, is an educational circuit through different points in the region as different points in desertification and anti-desertification, which vie as the clash of two temporal orders in space.

Evacuated villages and ecological refugee settlements built by the government juxtapose and suggest a demographic process locked into the rambling of an ecological one. The earth overtakes and reorganizes place too quickly for names and habits to follow and places become disjointed. Toponyms have not kept up pace with changes in the environment. They mismatch with present realities, drawing attention to absences, like the vast saline-alkaline field that used to be, and is still called Qingtu Lake at the county's edge. It is memoralized by a red granite spire near a basin where laborers work to build and rebuild grass barriers into the wind-vulnerable lakebed. Farmers who have lost their fields to sand now work as labor in the construction and maintenance of the various biotic and abiotic infrastructures for sand, noting where things once were. People my age tell me of how a decade earlier they might have swum in the basins that now supply fine alkaline minerals to the wind, materials for dust storms. Each one of these landscapes of memory and habit suggests not only a past loss, but as desertification rolls on, gestures at a future one: the lost lake serves as a cautionary landscape for places not yet 'swallowed' by sand.

Sand time has become is crucial to the interpretation of Minqin's landscape as a kaleidoscopic diffraction of a time proper to the movement of sand. It provides the format of a material and interpretive symmetry between time and space. Sand time, because it is configured precisely as a speed of a shifting and mobile earth, materializes as also a spatial phenomenon. Speed is a relationship between time and space. In a mobile landscape, topography is defined as a change in progress, and the distance of sand in motion can be expressed in a time-range. The future, therefore, can be registered, in warnings of a fate that might yet be deferred or averted, as a process in space – the moment at which the two deserts touch.

This makes sand a way of registering a temporal relationship between places at various points in the projected trajectory of the advancing deserts. Places where sand has already encroached become images of the future in other places – this is the topographical and chronopolitical structure through which sand's projected movement can make one place a

warning for another, its past the image of a future. What bears noting is how the elements of this landscape seem to fracture the coevality of the place into a living and dying demonstration zone of desertification in its multiple moments, a way of seeing desertification unfold in time and space. It arranges landscape conditions in a roughly legible sequence through which it becomes possible to interpret extant places as tickmarks on an environmental timeline. 'Desertification' in this way refracts different places in the landscape into a range of potentially sequential and non-coeval exemplars, one space variegated into many sequential times. The futures of desertification in the town center have already been realized at sites farther beyond the sand-line, and the town center is to be insulated from a future that has already happened in sandswept lakebeds, knee-deep with absent water.

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Desertification, which in Minqin is tracked to the movements of sand, invokes many strange times. Minqin County, its past and its future, are inserted into national time as the living embodiment of a time structured by moving sands. Its speeds are multiple. It happens slowly enough that it can be apprehended through projections of the speed of the deserts expansion and life in Minqin is lived in a kind of limbo, a waiting for a future fully aligned with the sands that are always approaching. Local officials and engineers predict that Minqin, at present rates, will be uninhabitable within two decades, due to sand encroachment and the depletion of its groundwater. Large-scale irrigation and anti-sand engineering projects are not simply a matter of survival but a way of installing a temporal bulwark against these processes, if not to reverse them then at least to slow them. The slowness of this process is nonetheless too fast, so that desertification engenders a vertiginous politics of time, oriented at a process of ecological change that is at the same too fast and yet demands patience. Dust storms, and the winds that move them, punctuate the "slow violence" of faraway desertification, impeached from urgency in a deferral of its temporal-spatial consequences (Nixon 2011).

Figure 13: Minqin County's single road and aqueduct, with desert on either side.

But the ongoing survival of Minqin, as a charismatic site in the geography of sandy disasters, has become an important symbolic site for the national fight against sands. Since official attention from Premier Wen Jiabao, who had his first official posting as a state geologist in Gansu Province, Minqin, wedged between two expanding deserts, has become a proving ground for the capacity of the Chinese state to weather desertification. For this reason it has attracted many millions of dollars in government investment and has become a demonstration and experimental zone for testing and display of sand-fighting techniques. As Minqin goes, so do other sandlocked places.

As a model site for national anti-desertification work, it has, ironically, become an exceptional place, since the political investment in holding back sand here has driven exorbitantly expensive and complex infrastructural projects. Minqin is sustained by waters from the Hongyashan Reservoir, China's largest desert reservoir which is linked to the County by a single aqueduct as a lifeline. The reservoir drains regions far beyond Minqin, and government officials boast of its hydrological scale. Filling the reservoir to water the projects for keeping the desert at bay has required a diversion of rivers, supplemented by a need for sinking increasingly deep wells. Those families that can still farm despite the deep controls on water use in the region speculate that the reservoir and thus Minqin are watered through a massive hydrological re-engineering of the entire region, as the county siphons water from surrounding areas and, as rumor has it, has triggered the diversion of the Yellow River itself.

Where elsewhere water flows, in Minqin it is necessary to hold things in place. Water, pulled out of the ground is sprayed back onto it, to feed the struggling walls of saplings and to soak temporary density and structure into the soft, loose sand. If Minqin was once a small waystation on the Silk Road, today, the city itself exists as a wedge between deserts. As its population, economy, and politics are depleted by the encroachment of sand, it has become itself an infrastructure charged with keeping afloat in a dry ocean. Faced with a crisis of depopulation, economic depression, and the collapse of agriculture, local officials understand the movement of water as a way of keeping both people and the land in place. It is this water that keeps the walls of trees upright against gale force winds and the relentless pressure of advancing sand.

Figure 14: Minqin county's slogan, in the reproduced calligraphic hand of Premier Wen Jiabao: "Minqin must not be allowed to become a second Lop Nur."

Negative Example

As a symbolic landscape in China's fight against deserts, Minqin is a model both of what can be achieved but also a model of what must not be allowed to happen. Where it is the county's burial that forms the 'natural' end to the processes of desertification, it is the prospect of Minqin's failure through which it gains its place in the emplotment of sandy futures in China. The demand to forestall this disaster has found Minqin narrated, in its landscape and in the landscape of Chinese anti-desertification politics, through what it must not become.

Nowhere is this constitution of Minqin as a negative example more evident than in the ubiquitous repetition of a slogan that has become a cypher of Minqin's place in the political spacetime of Chinese desertification. In the calligraphic hand of Premier Wen Jiabao, who studied engineering and had his first political post in Gansu Province's bureau of geology, what has become the county's slogan hangs over this outlook and over Minqin's square: "Minqin must not be allowed to become a second Lop Nur" (*Jue buneng rang Minqin chengwei di'erge Luobubo*). The Lop Nur to which it refers was once an inland sea of more than 2000 square kilometers in China's Xinjiang Province, then a salt marsh, which dried out in the 1960s to leave an arid basin. The Taklamakan Desert at its edge, in lore, is a site of kingdoms lost to the sands.

Here, 'Lop Nur' references a place as an event, the completion of the desertification process, a process that is politically enacted as a template through which to coordinate various places in China as repetitions of this process.

This is an ironic spin on practices of city modeling in China where municipalities vie to present themselves as a bundle of techniques and best practices, in order to realize themselves as competing models for an emulable vision of the Chinese urban future. Such modeling has become a key technology to city-building in China, as cities aim to become synonymous with models of the future that can be repeated (Roy and Ong 2011). Lisa Hoffman, writes of the ex-industrial city of Dalian in China's northeast, arguing that such "modeling is a practice of assemblage that produces a new regime of green urbanism" (2011:62) out of which a 'Dalian Model' of sustainable city planning in China can be circulated. Where other cities vie to offer themselves as models of green urbanism, Minqin's status as a model is more ambiguous. The exemplarity of 'Minqin' has less to do with modeling a mobile and emulable urban technique and more to do with the semiotic and material processes by which the place is associated with an event, a burial that may always yet be on the horizon, discernable in the relentless forward movement of sands.

The slogan organizes an understanding of desertification's time as linear, in the sense of a sandy motion that organizes past, present, and future as moments in a progressive burial. But it also makes this linearity a serial process that repeats across space; the event of desertification, after the desiccation of Lop Nur, is framed not as a singular event, but as a repetition that might yet be averted. The slogan, and the time that it inserts Minqin into, has the curious effect of making Minqin's possible future the repetition of a past event, a second Lop Nur. In it, the two places, Minqin and Lop Nur, are not related as geographical places, but rather are related ordinally, as a first and a second in time, distinct iterations of a singular process of disappearance. This sequence suggests a perpetual reoccurrence across space, a third and fourth *ad infinitum*. Minqin's future burial emerges with the status of an event that is repeatable all across China.

In the slogan, Minqin's future is told as a warning, referenced through somewhere else and told for the benefit of other susceptible places. In such a warning, Minqin's shifting topography and especially the two shores of sand that swallow lands closer and closer to the county town are cautionary. I mean 'cautionary' in the sense of a cautionary tale, a literary form whose specificity operates as a device to set up its potential generalizability. In cautionary tales, the subject and setting of the story are never what the story is 'about.' They are stories that are told through a place that are about other places, each of which becomes a potential repetition of the story that must be avoided.

Cautionary tales might be understood as a practice of negative exemplification, offering models that are to be avoided rather than imitated. They are to be read as warnings that what happens – will happen, may happen – is something that has happened and may yet happen elsewhere. Minqin's exemplarity as a site in the geography of anti-desertification politics is doubled: first as a spectacular staging site of the country's fight against sand, and second, as a living warning site of the ravages of a desertification that could befall other sites. The future of Minqin in this tale is a future that travels, or that can be read in many places, and so just as Minqin's future is narrated as the repetition of a past event, it is also a warning for other places and other deserts. And if for much of Chinese modern history, the future was the site for the emergence of the nation in time, and thus the site of a promise and goal (Duara 1996), here, the future is precisely that which must be avoided, pushed away as long as possible. Minqin stands as a model of what other places must not allow themselves to become.

The politicization of desertification in Minqin as a cautionary model and anti-model for other sites in China suggests a schema for evaluating different places in China's desertifying and potentially desertifying territories as various moments in the timeline of a general process of desertification. Desertification in this narrated Minqin is an ecological process and a geophysical speed, but also a demographic, economic, and political process. The emplotment of Minqin's desertification as a cautionary example of desertification in other, more important places – especially Beijing, in close proximity to desertification in surrounding Hebei and eastern Inner Mongolia – indeed suggests a national landscape that can be graded into moments in desertification. It haunts the national territory as making every place a site that is pre-disappeared.

For an Eternal Present

One realignment of political time by sand has happened: the endurance of the present rather than the promise of the future has become a political end. Where Minqin is a potential Lop Nur, the future exists as a coming threat rather than a space of opportunity. It must be deferred indefinitely rather than realized. This is a stark departure from a chronopolitical socialism in which Ann Anagnost argues that revolutionary political action was indissociable from "tactical plays on time" (1997:7) aimed at accelerating the future. Where the future has become the site of a past disaster that must not be repeated, it has become cautionary, something to be averted. In this sense, then, against a future plotted out by the advance and motion of sands and dusts, the chronopolitical goal becomes one of extending the present indefinitely, stalling time in a state of ongoing endurance. Not allowing Minqin to become a second Lop Nur means stalling it in an everlasting present, steadying it against a future wrought in the movement of sands.

Where desertification and sandy movement have become the genres through which to understand the relationship of Minqin's landscape to time, it has also realigned politics to fighting desertification's version of the county's future. It is in this sense that the engineering of the landscape into stability must be understood as a bundle of measures for reactivating the present as an existential deferral of the future. Where the future here is emplotted as a disappearance, it is the present that is the end of politics, and not the future. Stopping the sand is to stop its time, but as the sands continue to move, or more precisely, to retain a capacity to motion, the present is occupied as a state of waiting, experienced as a distance in time from a fixation on the local end of time here. Holding back the sand is a way of counteracting sand's time against the state.

The planting and growth of a tree wall, the building of nylon or straw barriers, or the spraying of petroleum onto the sand are thus simultaneously technologies of topographical control, aiming to fix the land in place and re-establish the hardness of earthy boundaries, as well as ways of opposing the progression of processes of environmental deterioration. The growth of trees is linked literally to a sustaining, a bid at endurance in the present whose goal is no longer to realize a utopian future but simply to extend, in time, the existential possibility of a future, any future. The growth of trees, fed by hydrological engineering and intense government spending, is a chronopolitical intervention against a future in moving sands. A chronopolitics aimed at the future is reorganized into techniques for lingering in a jealously stabilized present. Where the future is increasingly narrated through what must not be allowed to happen, political time has become aligned with constantly maintaining a "windless present," lest the future here, and elsewhere, wash away in a sheet of dust.

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Successions

In this section, we consider how desertification research and engineering aims to discern multiple times out of sand dunes, then to deploy some against others. The surface of a dune becomes a chronopolitical battleground in which some environmental processes are deployed against others. I suggest that to stabilize shifting dunes to neutralize sand-time, specific figurations of ecology and notions of succession are operationalized in scientific research as potential foundations for engineering interventions. This will take us to Naiman Banner, the site of an important desertification field research station in eastern Inner Mongolia, where a team of scientists and students go each summer to conduct research in the field. There is a flurry of construction at the research base just outside Naiman Banner's city center, as teams of workers contend with surprise summer rains that make the sands into a thick mud that renders country roads, rutted out through use across still-unopened grasslands, unnavigable. Research teams of ecologists, many graduate students, are busy going through the field station's roster of experimental sites scattered around the Horqin Sandy Land (*Ke'erqin Shadi*), setting up individual experiments, gathering soils, surveying vegetative cover.

What is striking to me is the absence of urgency with which these desertification scientists approach the problem of desertification, which in so many other places has all the momentum of an apocalypse traced through the irrepressible havoc of physical process. Much of this relaxed approach to sand has to do with the pacing of field research and the research culture of the field station (Traweek 1988), of which Naiman is one of a dozen. After a long winter, many of these scientists think of research at the field station as a sort of vacation like summer camp, where the days are long, we all live in dormitory-style housing, and they are insulated from the everyday worries that await them in Lanzhou, where their main research hub is located. We chat and laugh over meals together, and go for long walks in the cool evenings, or sing karaoke in the station's conference room. We sip beers while spitting apricot pits on the ground. The days are long but leisurely doing field research, and are colored by a comradery and joy in research that I have not found elsewhere.

The research station was set up in the 1960s as a local branch of the Chinese Academy of Sciences to assist technically with dune stabilization around railroad tracks, but since then, the station, under the leadership of Zhao Xueyong and other field ecologists, has become a key node in researching desertification mechanisms and ecological interventions against sand's movements. For many of the scientists, summer field research takes them, in the research station's small flotilla of hired vehicles, through Naiman county through a roster of past field sites which are revisited each year as experiment sites. Naiman Banner is amongst the most desertified in China, with 90% of its soil composed of Aeolian sand (Duffy & Migongo-Bake 2003:68). While investment in sand stabilization in Naiman Banner was historically linked with the engineering of a national transport infrastructure in the first decades of New China, the environmental engineering institutions that set up in Naiman as a local project area have stayed behind reworked into scientific research stations. They provide the institutional and intellectual infrastructure for decades of anti-desertification research and experimentation beginning in the mid-1980s, achieving moderate success in the 1990s through programs, led by ecological scientists, to change the grazing and planting practices of villagers. Naiman Banner and the work

of scientists at the research station was deemed a 'success story' by the United Nations Environment Programme in 1997, and the literal fruit of these programs marks the social and economic landscape of the place. Each summer, for instance, a Watermelon Festival memorializes the ecologist-led transition from growing water-intensive grains to cash crops, celebrating especially the varietal that many farmers still refer to as "Desert Station Watermelons" (*shamozhan xigua*).

Each morning, just after sunrise, we pile into minivans and set out for these fieldsites. These day-trips are both data collection sessions and training sessions for newer graduate students, part of the informal networks of mentorship through which students become scientists. Where Minqin's landscape has become a paradigmatic example of a deterioration in progress in the tethering of political and environmental narration, these scientists, reading Naiman's landscape in time, and as time, see its changings through other processes, staked closely to the ecological engineering techniques through which the desertifying region is to be renovated.

The team is interdisciplinary, and in the ways in which sand control programs bring together many ways of seeing the earth, the landscape becomes multiple, the material and processual substrate of multiple entangled futures. Depending on the day, its composition shifts: there are hydrologists, ecologists, remote sensing specialists, botanists, geologists, and myself, the only social scientist, but they have worked with others in the past. In these trips, we are learning to read the landscape as a desertification scientist must.

Naiman and the Horqin Sandy Lands, which exemplify a recent desertification in progress as well as the result of decades of government ecological engineering research, have become, under the auspices of scientific authorities, a sort of incubator and laboratory 'in the wild' in the desertification sciences. Like Minqin, Naiman has become closely associated with China's fight against desertification, and so its landscape has undergone a similar movement of political and scientific generalization and exemplification. However, political investment has taken a decidedly less spectacular cast, and this exemplification has occurred through the recuperation of much of the Banner's landscape, with its mix of forestry, farming, pasture, and dune areas, as an experimental zone for studying desertification and potential interventions. This exemplification is also the epistemic effect of desertification research which has staked itself in demonstrating the generic-ness, and thus generalizability, of Naiman's research as a fungible microcosm of China's deserts more generally (cf Ong forthcoming). Moving through Naiman's landscape with desertification researchers is thus to move between sites designated by them as landforms and biomes that are 'classic' (*dianxing*), taken to be representative ecological and geophysical types: landscapes become categorical, but these categories are understood as slices of time in a process of unrelenting change.

If Minqin's imminent disappearance, immanent in the sands, makes it one way of emplotting the chronotope of a China racked by desertification, Naiman, figured as a patchwork of 'classic' landscapes, becomes representative of another desertifying China. For ecologists and field researchers at the station, the relevant conflict is a matter of how different environmental processes scatter the landscape into an assemblage of different temporalities. Landscapes become living exemplars, again, of moments elaborated in scientific theories of landscape change, and they are categorized quickly and easily as part of a scientific habitus that must be trained and inhabited through a field pedagogy.

In our travels, each day we spiral away from the research base on roads, through sand drifts, or across 'unopened' grassland – much of it being plowed into cornfields, driven by the high market price of thirsty corn to feed livestock in other parts of the country. Farming, and the

opening of new land to farming (*kaikeng*), is rolling across the grassland, and everywhere there are fresh furrows offset by degraded pasture. The scientists note many kinds of landscape, with special interest to those that best match the characteristics of 'classic' exemplary categories: farmland, grassland, wasteland (*huangmo*), manmade forest planted as windbreaks, and finally sand dunes (*shaqiu*), which themselves must be categorized into types on a spectrum from mobile to stabilized.

Ecological Timelines

Of greatest interest to many of these scientists are the fields of dunes, some of which have appeared in the years since the oldest students have been coming to Naiman for summer research. For desertification scientists and researchers at the station charged with determining new ways of stabilization dunes, categorizing the dunes gives a way of imagining the renovation of undulating sandy landscape as a progression through stages. Fang Jie, a recent PhD who and remote sensing specialist who normally works in GIS, explains to me and the fresh batch of students that despite appearances, not all dunes are the same, and that the physical and botanical properties of specific dunes will be very important in determining how to categorize specific dune formations.

In the notes that Fang Jie and the others give, this classification of dunes into four grades of mobility is of fundamental theoretical and practical importance: fixed (*guding*), semi-fixed, semi-mobile, and mobile (*liudong*). In this scheme, the landscape becomes a gradient of potential speeds. Fixing dunes into a set of sequential stages, from mobility to stabilization, also provides a working blueprint of sand control (*zhisha*) as working a dune through the categories. While the four grades indicate a typology, they indicate more a spectrum of dune states each of which can be thought of as a permutation of the others. Mobile dunes in 'flowing movement' (*liudong*) generally indicate sites where desertification has happened most recently. They are typical of sandy deserts where the interplay between wind and sand is most direct (see chapter 1), while fixed and stabilized dunes maintain their forms even in strong winds.

Semi-mobile, semi-fixed, and fixed dunes indicate a reversible progression of structural properties. For ecologists, this gradient of geophysical potentials is also an emplotment of different botanical-ecological conditions. Little Hong, for whom this is the second summer in the field, explains, "We can classify dunes by their structural properties, based on estimations the vegetation coverage (*zhiwu fugai*) on the dune's surface." In this schema, Little Hong suggests that it is not simply that a dunescape must be envisioned in variegated conditions of potential motion, but also these geostructural properties can be registered in relationship to the ecological and botanical profiles of dunes. Classification of a dune thus takes place along two parallel axes, along which geophysical and botanical-ecological conditions are each taken as the sign of the other.

As the ecologists scale up the slopes of dunes, in the process loosening the hardening crusts into rivulets of sand with their feet, they measure vegetation coverage by opening a collapsible wooden square of one square meter to determine an area to count plants in. But it is not simply the amount of vegetation on a dune that they are interested in. Quantity, as a percentage of coverage, is a rough measure of number, but tells very little about how to understand where this square meter of the dune stands in the process of stabilization. Stability of the plant community, in fact, is the ideal condition for stability of the dune. In our evening walks

in the dense stabilized shrubland behind the research station, students talk with one another about what kind of ecology is best for dune stabilization. Meng Qi, an older ecologist, tells me and a first-year student that we might be tempted by diversity, but it is not the case that more species is better. Rather, when we look at plant communities, we are interested in their stability: how long a community can persist while holding its environment steady. For this, it is more important to note the specific species that are in the square and to describe the composition of the specific community of plants and their relative numbers.

Figure 15: Field ecological measuring of ground cover.

Fang Jie instructs the team to be on the lookout for *shami* (*Agriophyllum Squarrosum*), a small grass that can establish in soil that is dry, unstructured, and mobile. Searching for it is a matter of attention, as it is easily missed on the shocking field of tan on the surface of a shifting dune at midday. He pulls out small clumps of it from otherwise bare dunes to show the group. "Although it does not look like much, *shami* is very important because it is a pioneer species on shifting dunes. It can grow on very loose sand with very little water. These are conditions where other plants cannot grow."

Looking for the modest *shami* plant occupies the ecologists' attention because the establishment of this pioneer species in the shifty surfaces of dunes indicates, to them, that the dune is at the beginning of an ecological process called succession. It is a way of seeing the dune at a consequential crossroads of multiple emplotments of environmental time, where its present mobility may be captured into a future stabilization. Classical theories of succession among other

things, describe a relatively stable "definite process" (Clements 3) through which a denuded environment, like the barren surface of a landscape after volcanic eruption or sand dunes on the coasts of Lake Michigan (Cowles 1899), undergoes successive waves of colonization by plant communities. In the succession paradigm, "succession is universal" as a process by which pioneer species like lichen – or here, fast-growing *shami* – adapted to the extreme conditions of these post-disturbance environments establish, changing the environment so that other species like grasses or shrubs will establish, which in turn will be succeeded and overtaken by other species. In the classical ecological thought of Frederic Clements, the "life-history of a formation" was a teleological process from "nudation to stabilization" (4), in which synchronic botanical communities could be interpreted as slices of time arranged in definite stages, at the end of which there would be a stable climax community that had been the 'cause' of the process.

The succession paradigm refers existing communities of plants to the process by which they rise and fall. It makes *shami* and other weedy, aggressive R-selected species a botanical embodiment of an ecological future to come, one that is already in process. That is, as pioneer species establish, they become images of a future that is already in the making. Pioneer species provide a botanical basis for capturing a shifting dune, conceptually, in a theory of time that can be mobilized as a corrective to the time of sands in perpetual motion. In the theory of time that succession undergirds, *shami* and other pioneer species provide a way of seeing problematic landscapes as works in progress at the start of a stage-like progression that ends in stabilization.

Reading succession into the surface of a dune provides a rough blueprint and roadmap for thinking about the task of dune stabilization as a matter of speeding a community of plants through its successional stages. This stagism makes the progression of a dune through its various grades a matter of moving it in stages along a linear process. This roadmap, in which existing plant communities are presumed a temporary stage that prepares for what comes next, makes notions of succession highly resonant and conceptually fungible with stages of dune stabilization. Each sees the dune's surface passing through distinct steps. Both end in a 'stabilization' – that of ecological climax communities, characterized by larger and steadier K-species, and that of a geophysical stabilization wherein the dune is more resistant to Aeolian desertification. So if the scientists learn to read a dune's stability through its vegetation, the reverse is also true: inducing changes in the vegetation can also be a way of intervening and speeding the process of dune stabilization.

A shifting dune appears at the intersection of two processes that project the dune through different futures. If the sands remain mobile, then its future can be, like in Minqin, read as a movement forward through space. Creeping pioneer species, however, locate the dune at the beginning of stabilization, trading the movement of the landscape in space for the passage of the botanical-geophysical conditions through successional-structural stages. Succession, then, is a way of referring a dune to its future stabilization. A weedy grass makes the now a not-yet. While the Clementsian succession paradigm, especially its organismic and teleological presumptions has been widely critiqued (Worster 1990) through ecologies that emphasize chaos and emergence, for our purposes, and for the desertification scientists, however, what it offers is a way of conceiving and realizing a future stability. But more importantly, it is a way of renewing a future-orientation, so that the mobile sand dune is not the aftermath of desertification, but the beginning of a stabilization tracked to ecological change.

For ecological engineering, then, the task of sand control has to do with installing and speeding structurally-desirable timelines into dunes. It is a matter of re-territorializing a dune, through ecological interventions, into linear timelines that are formally resonant with statist

temporalities. While *shami* occurs in the wild, it is not the only pioneer species that can establish, and perhaps not the best for kickstarting succession. On a dune, pioneer species accomplish two tasks. First, like the larger plants that are to succeed them, they produce small areas on the dune that are held stable enough so that other plants can establish, and secondly, they improve the sand into a fledgling soil by increasing organic matter at its surface. These tasks can be roughly achieved through infrastructural means, as when grids of grass squares, made with leftover grain stalks from local agriculture, are dug straight into dune surfaces. These fracture the surface of the dune into a patchwork of small wind-shadows, and, in less arid climates, as they decompose they add organic matter to the sand.

But researchers at the Naiman Station are also interested in the evaluation of other plants as pioneer species that can be used in speeding succession on a dune. Many of the researchers here research the shrub *yanhao* (*Artemisia Halodendron*), which is a pioneer species that can establish on shifting dunes but also continue to grow on fixed dunes. A study published in 2014, coming out of research at Naiman, compares *A. Halodendron*'s strategies for nutrient resorption of senesced leaves across different dune types, showing that the plant was adaptive to different microenvironments. *Yanhao*, they argue, "under nutrient limitation [in shifting dunes] is more likely to manage with a low level of nutrients in senescing leaves, giving this species an advantage in infertile soil" (Li, *et al.* 2014:182). In particular, they suggest that in nutrient-poor environments, the shrub incompletely reabsorbs foliar nutrients, which means that that the plant and its falling leaves contribute "to the return of high quality litter to the soil," starting a multiplier effect by which decomposing plant matter "accelerates leaf litter decomposition and nutrient mineralization" (183).

In their conclusions, they suggest that as *A. halodendron* "pioneers into shifting sand dunes" it accelerates the process of dune restoration. The plant itself here appears as both an indicator and an accelerator of ecological time on the dune, as it speeds the process of succession by stimulating the improvement of the dune's nutrient environment for other plants. Its potential use in accelerating succession and therefore stabilization at the level of a dune suggests that ecological succession is both a way of imposing a temporality and set of expectations on the shifting mosaic of plant species that pioneer a dune, but also of thinking of pioneering a dune as a tactic of topographic control.

In the fungibility through which geophysical and ecological sequences are aligned in desertification sciences and engineering, ecology, in this adaptation of succession to stabilization, can be rethought as a chronopolitical technique. Succession and stabilization become linear processes in time, each of which, in principle, ends in stable dunes. Kickstarting the process means that ecological principles are reframed as engineering principles. Pioneering describes not simply the process by which a successional series can be thought to begin, but also a political technique in which flowing dunes can be captured in an ecological timeline amenable to state goals.

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Coda: Social-Ecological Succession

While ecological succession, in its botanical incarnation, allows for the technical reframing of dunes as ecological construction zones, for the ecologists I worked with at Naiman,

it is also resonant as a way of narrating changes on a landscape that has always been in social and ecological flux. When I ask desertification sciences and students on these trips what the prospects are for combating ongoing desertification, which is clearly happening, and which, by all accounts, can be clearly linked to the over-opening of new fields for farming driven by national policies for replacing farmland lost in the urbanization of coastal and southern China, they respond by narrating any landscape as a transient moment in a long cycling of times. Xie Tingting, a young hydrologist, puts it this way:

> "All over China, places like this that appear to be pristine have been settled for thousands of years, and the land is put to many uses and undergoes many changes. It is not like in America or elsewhere where land is plentiful – here, there have always been people and they have always worked the land in different ways. When we see these farmlands being opened up, this is something that has happened many times in the past. People farmed the land, and that changed the land and it deteriorates and underwent desertification. When desertification has happened in the past, grass has come back, and then people will come in graze here, and then, when the land is ready, others will come in and farm again. This has happened many times over thousands of years here."

Where the ecological stagism of succession in engineering is recuperative, in that it does not explain desertification but provides a way of implementing its remediation, for Tingting 'disturbance' is already part of the way a landscape has changed for a long time. 'Succession' and its emplotment of stage-like changes over time has become what Deleuze calls an abstract machine, a "diagram independent of the forms and substances, expressions and contents it will distribute" (1987:141). The plane at which diverse, but formally resonant occurrences can be related is through an abstract machine, an "engineering diagram shared by very different physical assemblages" (de Landa 1995). The relationship between ecological and what we might call social-ecological succession would not be metaphorical, but 'abstract' in the sense that they can be understood as distinct iterations of a single abstract form. Just as the face of a post-disturbance dune is determined by an eternal cycling of plants in succession, so is the form of a landscape envisioned as a cycling of human-plant-animal assemblages, each of which prepares the earth for the next. While desertification comes into national environmental discourses as a disaster in process, for Tingting, it is a moment in a landscape that is made at the confluence of social, economic, ecological, and physical processes.

At the center of her way of seeing the earth, where succession has shifted from an ecological principle to a framework for general time, is a relentless, cycling change. The earth is not a stage but a participant in a process where it both shapes how people, animals, and plants come to inhabit and labor on it, even as it bears the effects of these habitations. In Tingting's ecological succession, human history is a strand among other in that vast machine that is an environment. The endurance of China and the endurance of the earth bind together as moments in a process of change.

Certainly the narrative of a stable cycle of land uses and ecological changes is over-simplified, questionable both in its historical bases and also in its washing over political histories of exchanges and conflicts between herding and farming peoples in the inner frontiers of China (Lattimore 1940). Such an understanding nonetheless builds on a historical sensibility toward land and history that understands it to have been always already anthropogenic, already bound in

an entanglement with the effects of human life. It is, however, not an invitation to focus on the powers of humankind to shape landscapes, but rather, to think of human economic and social arrangements as consequential elements in an ecology through which they are also acted upon, spurred by changes in the land. Farming becomes a desertification-causing ecological disturbance, and desertification drives people away from the land. As pioneer grasses grow back and grassy ecologies re-establish, herders are economic pioneers that prepare the land for farming again.

The ecologists's land in social-ecological succession is an encouragement to think about periodization and timescales. I heard repeatedly the stereotypical claim from my scientist friends and colleagues that China has a continuous history of "5,000 years." This claim, and this number, is ubiquitous in China as a claim to the depth of civilizational time, against which everything else appears upstart. Despite the chauvinistic overtones and historiographic iffiness of this claim, it nonetheless structures an idiosyncratic sensibility to time and the prospect of change over long cycles. For my ecologist friends, gazing over a landscape narrated as a cycling of social and ecological changes, it was offered as a ready frame in which historical and geological time could be discussed in the same timescales, rather than sorted into different speeds that must remain separate. If for many, today's Anthropocenic time is a violent collision of historical and geological times, in the long China that forms the backdrop to her ideas of succession, modernity, for all its turbulence, might still be lived as though rooted in the deep time of environmental processes that both shape and bear the effects of human action.

Chapter 4: Particulate Exposures: Life and Breath in Urban North China

"The big city is as full of such breathing-spaces as of individual people. Now none of these people is like the next, each is a kind of cul-de-sac; and just as their splintering makes up the chief attraction and chief distress of life, so too one could also lament the splintering of the atmosphere."
-Elias Canetti, The Conscience of Words

Canned Air

In early 2013, as Beijing was enshrouded in record air pollution, recycling entrepreneur and billionaire Chen Guangbiao took to the streets. Dressed as a large orange aluminum can, he handed out smaller orange cans emblazoned with his logo-fied face to curious passersby. The cans were empty. Or rather, they were filled with a consequential nothing: each contained a volume of compressed, fresh air, devoid of the fine, dense particulate matter that hung in Beijing's soupy atmosphere. The air came in multiple 'flavors,' canned at their respective atmospheric sources: pristine Tibet, whose distant, upwind airs remained purportedly untouched by the adventure of 'socialism with Chinese characteristics'; Yan'an, the hallowed red capital of the 1930s and 40s, purified in the residual singe of Revolution; postindustrial Taiwan, an extant model of a clean Chinese alter-future[i]. These flavors determined a geotemporal trajectory that linked pasts and possible futures across the various airs of a China differentiated into experiences of breath. The jovial entrepreneur distributed 230,000 of the cans for free, but sold another 12 million at the hefty price of 5 yuan a piece, about a dollar each[ii].

Each can might be read as a small moment of what Peter Sloterdijk calls an 'air conditioning,' the "disconnect[ion of] a defined volume of space from the surrounding air" (2009:20). The tiny volumes were released into an atmosphere of suspicion, where the contents of urban air, and the respiratory vulnerabilities they suggested, thoroughly linked urban experience with debilitated breathing. As they traced out a market in breath, they also dramatized the emergence of embattled pulmonary systems as a key embodiment of the fading promises of the invincible juggernaut of Reform and Opening, China's experiment in socialist marketization. Indeed, in interviews with Chen, the canned air must be seen in part as a contemporary re-activation of s socialist investment in the integrity of a body politic choked by the atmospheric fallout of its own dubious progress, in need of nurturing and protection by a son of the People. But more immediately, the air in cans served only to emphasize what had already become unbearably obvious by 2013, halfway through the fourth decade of Reform: breathing had become a modern danger, clasping breathers to the polluted air in a toxic, debilitating knot. Canned air married markets and biopolitical nationalisms, so that, for a price, China's urban everyman could breathe, at least for a moment, like officials in government buildings, whose corridors and offices were rumored to be lined with expensive air purifiers that ramified respiratory privilege as a perquisite of political position (Jacobs 2011:A4).

Certainly, commoditized air enacts a gross primitive accumulation of air, what Elias Canetti calls "the last common property" (1979:13). But the cans, as a tantalizing promise of respiratory shelter in a handheld serving size, might also be taken as an incitement to consider a city and its atmosphere rendered as volumes. Each can could be understood as a small moment of what Peter Sloterdijk, in his elaboration of an atmo-morphological vocabulary for modernity,

calls an 'air conditioning': the "disconnect[ion of] a defined volume of space from the surrounding air" (2009:20)[iii]. The cans are not merely the monetization of air, but the realization of a hermetic air-*space*. They anchor, in their circulation, an opening to a mode of inquiry into the urban in the haze of a city identified as much with its sky as with its buildings.

An inquiry to a mode of civic life attuned to the air as a perpetual vector of damage, and to breathing both as life and its erosion, begs an appendix, to Michel de Certeau's famous injunction to "a theory of everyday practices, of lived space" (1984:96) composed of the myriad spatial practices through which cities are made and undone: what if walking in the city was also breathing in the city, not merely an appropriation of urban spaces, but also an appropriation *by* them in the relentless breach of inhalation? How can we consider the lived form of the Chinese city through this idiosyncratic respiratory architecture, a proliferation of conditioned airspaces? As buildings fade into the contracted visibility of the urban pall, a different city actualizes, a rendering of city space as an architecture of nested volumes rather than gleaming surfaces, a city of fixed and mobile interiors scooped out of the dangerous sky. Containment of the air and of breathers in the air discloses habitation as what Sloterdijk denotes as living in bubbles, or "creating the dimensions in which humans can be contained" (2011:28).

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> The U.S. AQI does not include recommendations for PM2.5 levels above 500, but levels are sometimes worse ("beyond index"). What should I do?[12]
> - Pollution is hazardous at these levels. Everyone should take steps to reduce their exposure when particle pollution levels are in this range.
> - Staying indoors – in a room or building with filtered air – and reducing your activity levels are the best ways to reduce the amount of particle pollution you breathe into your lungs. Read on for more information on steps to help reduce your exposure to short episodes of high levels of PM2.5.
> - Links to recommendations for reducing exposure to smoke from fires are available below. These recommendations may help reduce exposure during short-term pollution episodes in which PM2.5 levels are above 500, since fine particles (PM2.5) are the primary pollutant in wildfire smoke.[13]

This chapter explores contemporary urban China through the reorganization of spaces, bodies, and collectivities in the density and danger of Beijing's air, a condition that is becoming synonymous with urban life that I call particulate exposure. Such a condition of exposure, as an emergent embodiment of contemporary Chinese urban life in what no longer turns out to be a paradise (Zhang 2010), in its centering of breathing as a vector of necessary debility, making the autonomic processes that sustain life also the substance of its slow erosion. What is it like to live and breathe in a city whose atmosphere finds its closest referent, in embassy public health announcements released to Americans in the city, to being trapped in the smoke of a wildfire?

Because the city's location makes it especially susceptible to large dust storms, which suddenly thicken the atmosphere, meteorological exposure to upwind desertification is experienced in Beijing most directly as a particulate assault on the breathing public. This particular mode of particulate exposure drives the control and reconstruction of desertified sites upwind of the capital precisely insofar as, in air quality debates in the city, they are

[12] For the benefit of Americans and diplomatic staff living in Beijing's air, the US Embassy in Beijing, in addition to recording and disseminating its own air quality reports, released pedagogical public health information to educate American breathers about exposure to PM2.5.

[13] The US Embassy in Beijing, in addition to running its hourly updates of real-time PM2.5 and US EPA AQI ratings on Twitter, @BeijingAir, also publishes information on PM2.5 exposure for the benefit, officially, of the American community living and traveling in Beijing.

reterritorialized as parts of Beijing's dispersed airshed. Transforming desertified dust source areas on key airstreams emerges as a key tactic through which Beijing's atmosphere can be protected. In this sense, through suspended and suspensible particulates, Beijing's dense atmosphere becomes a collecting site for the earths of many other places.

My method in this chapter is in part ethnographic, part archival through official documents and journalistic sources, and in parts an engagement with "experiments in public culture," to borrow Lisa Rofel's felicitous phrase (2007). While meteorology has long hung as a political matter in China, threading through imperial times to antiquity (Elvin 1998), in this chapter, I aim to chart a more recent history of life in the air, especially since the explosion of public outcry over the measurement and reporting of PM2.5 particulates in Beijing's atmosphere in 2011.

In the first part, I explore the technical and political thematization of the air's particulate content during this time, in which arguments over the size at which airborne particulate matter were to be measured and reported by state meteorological bureaus suddenly exploded into public argument in Beijing. At the crux of these demands for atmospheric measurement was the re-enactment of the atmosphere and its suspended contents from an abstract environmental claim to a claim over embodiment through the image of urban life as a human assemblage of vulnerable breathers. Air composed not of pollutants, *per se*, but particles differentiated by size – and therefore penetrability of the lungs and body – reveals Beijingers as breathers, not simply in the air, but taking it in.

Next, we explore how exposure to poor air has driven new techniques of spatial management of the body, from architecture to airmasks, that aim to manage bodily exposure to the air by detaching breath from the general atmosphere in favor of 'air conditioned' spaces. I trace how the city's general atmosphere has burst, through high and low-tech mediation, into a profusion of enclosed airspaces, making the city a multiplicity of interiorized airspaces. In a city "under the dome," to borrow the title of journalist Chai Jing's viral (and now banned) TED-style documentary on Chinese air, the atmosphere has become the upscaled model of a general enclosure, one that can be escaped only by going deeper, into a more interior inside. Chen Guangbiao's canned air, in this sense, becomes an exaggerated formal precursor and exemplar of a more general shift in urban planning, habitation, and living that has seen the city burst into volumes of differentially breathable air, never fully enough delimited from each other.

In the later parts of the chapter, we shift from myriad forms of atmospheric shelter-making to explore how, in the earliest mobilizations over air, breathing emerges as the framework for an emergent form of political embodiment. In the explicit theorization of the body in the relentless incapacity to not breathe, the autonomic functions of bodily maintenance assemble the body dangerously in self-negating relation with airs and others. I suggest that such embodiment focuses us not on the agency of political collectives, but rather to an attention of double negative conditions, where breathing is not a doing or an action as much as it is a not-being-able-to-not. This incitement to a less triumphal form of politics, is a reminder, following Shigehisa Kuriyama's monumental work on winds and bodies in classical Chinese thought, that "the history of the body is ultimately a history of ways of inhabiting the world" (2002:237). This incites an attention to the many ways bodies and environments are drawn together as things which cannot be ultimately sundered into the comforting guarantees than an environment exists merely 'out there.' This point is analytic, but, as well shall see, also crucial to the way in which breathing-as-exposure shapes a particular politics of respiratory, bodily, and atmospheric debilities.

How will I know when conditions are better?

- Air quality conditions in Beijing can change rapidly. Check the U.S. Embassy or Chinese government air quality monitoring web pages for the most recent hourly PM2.5 readings. These readings can help you determine when to take steps to reduce your exposure.
- Also pay attention to weather forecasts; these can help you plan your activities for times when air quality improves, such as when winds are forecast that clear the air. When the air clears, and AQI readings are low, take advantage of these times to get outdoors.

Life in the air, exposed to its caprices and motions, was a major preoccupation of classical Chinese medical thought (Kuriyama 2002). Definitive of this conception of the body, composed of airs and analogous to the wind, is an ambivalent experience of life in the air - necessary for life but also the very substance of illness. Resonances abound. A 2013 study reports that since 1981, at the early outset of the massive experiments of Reform and Opening, across northern China, inhalation of suspended particulates had lowered average life expectancy by more than five years, and sapped an aggregate 2.5 billion life-years (Chen et al. 2013). This macabre calculus gives the fact of breathing in terms of a slow erosion of the life that it sustains. Breathing has become dangerous, necessary to life and also a vector of death, a point corroborated by other data released recently (2013) by the Beijing municipal health bureau that lung cancer rates in the city have jumped by almost 50% in a decade. Such studies recall an everyday complaint of life in the Chinese capital, where Beijingers narrate a necro-respiratory economy in which breath is traded for premature death.

Beijing, December 2011: coming out of the winter gray into a restaurant, my friend Li Qiang apologizes through an early winter cough for his lateness. Air purifiers hum ineffectually. We talk, like everyone else, of the gray pall that hangs heavily on the city, which has seen the blooming of face masks, as if by cue, on the urban peoplescape, a last line of defense for the impossible insulation of besieged lungs. Li Qiang has been in the city for five years now, since leaving his home in the frigid northeast for university. He has stayed on to work as an environmental journalist, but announces each time I see him that he is going to leave soon, abroad maybe, where the political and physical atmospheres may allow for more breathing space. Like many upwardly mobile Chinese, poor air quality has become a reason to consider emigration, configuring a "politics of destination" (Chu 2010, tied to reading the air and its effects on the body, rather than animated by hopes of better economic opportunities. Each year he lives and breathes in the city, he jokes, he trades for a year at the end of his life, and he hopes that maybe next time we will meet in America, or Germany, if he can find a fellowship.

On days like this, it is customary to complain about the air and the government. Where years earlier, locals adopted a certain cavalier attitude toward the air, boasting iron lungs among the other sturdinesses of Beijingers, this bravado has evaporated into the haze. In 2008, in the prelude to the Olympics, to criticize the air was to criticize the entire program of national restoration of which the Olympics was a final proof. Now, with his mask on the restaurant table, Li Qiang smokes cigarette after cigarette as we sip on weak lukewarm Chinese beer, shrugging. "It's nothing worse than what you breathe on your walk home or even in your crappy apartment," he remarks darkly, conspiratorially, seriously. What could the difference between conscious and inadvertent inhalation of particles be, besides a small moment of pleasure? It is a complaint constantly voiced in the city, an echo of a joke circulating Chinese social media in these haziest

of days: “Do you know what welfare benefits you get by living in the capital? All you need to do is open your windows for a smoke!”

@BeijingAir

Around us, everyone is talking about the air. It hangs with a palpable weight. Days of horrendous air quality has contracted daytime visibility to dozens of meters and has grounded upwards of 700 planes at Beijing’s modern airport, purpose-built just three years earlier for the Beijing Olympics. Amidst this obvious pollution, official meteorology declares constantly improving air quality, measured in ‘blue sky days,’ and ‘moderate’ amounts of suspended particulates, measured at PM10, 10 micrometers.

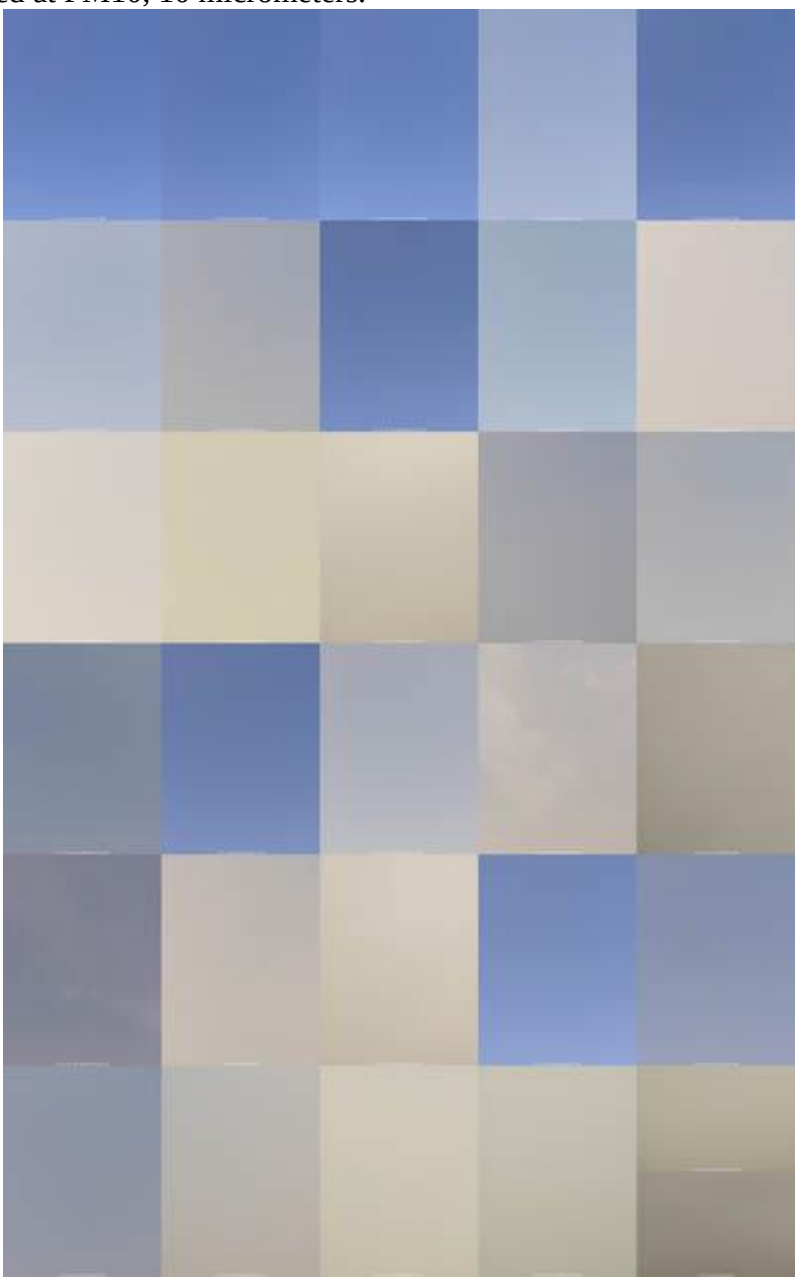

Figure 16: From CYJO (2013) "Blue Sky Days," an art piece that follows the notion of a blue sky day to stitch together photographs of Beijing's sky taken over consecutive days.

These numbers conflict outrageously both with the obvious severity of air pollution and with measurements of particulate density released by the US Embassy in Beijing through its blocked Twitter account. The confusion over the state's reporting of ever-increasing improvements in air quality was exacerbated by reports of air quality being released by the American Embassy in Beijing through a Twitter feed, @BeijingAir, operated officially for the benefit of embassy staff and Americans in Beijing. The Twitter account operated as an automated update of readings from a MetOne BAM 1020 continuous particulate monitor installed six months before the 2008 Olympics to monitor air quality around the Embassy compound, and which continues to report real-time air quality. Along with this, it made available lists of recommendations to American citizens in Beijing on ways to minimize exposure to fine particulate pollution. While in principle, Twitter is blocked in China, like most foreign social media sites, enterprising netizens and anyone with the relatively easily obtainable firewall-jumping software could access these numbers and American air quality reports, and suspicion over Chinese air quality metrics grew when juxtaposed with air quality information released by the US Embassy. However, because of the block on Twitter and other non-Chinese social media behind China's internet firewall, these numbers were officially invisible but very easily available. The discrepancies were obvious and drove a firestorm of public outcry.

	Beijing			Hong Kong			Europe			United States			
Particulate Concentration PM10 (μg/m3)	Pollution Index	Air Quality	Color	Pollution Index	Air Quality	Color	Pollution Index	Air Quality	Color	Pollution Index[1]	Concentration[2] (PM2.5)	Air Quality	Color
50	50	Excellent	Blue	45	Medium	Blue	75	Moderately High	Yellow	102	(~37)	Unhealthy for Sensitive Groups	Orange
150	100	Good	Green	88	Moderately High	Yellow	Above Index	Very High	Red	178	(~112)	Unhealthy	Red
250	150	Minor	Yellow	141	High	Red	Above Index	Very High	Red	238	(~187)	Very Unhealthy	Purple
350	200	Light	Orange	200	High	Red	Above Index	Very High	Red	312	(~262)	Hazardous	Maroon
352	201	Moderate	Red	201	Severe	Black	Above Index	Very High	Red	313	(~263)	Hazardous	Maroon

Figure 17: Comparisons of air quality standards and codings across different sites. Note, Hong Kong has a different air quality indexing system than China, under the one country, two systems setup. (from Andrews 2008)

The impropriety of American government organizations measuring and reporting Chinese air in conflict with Chinese meteorological reports became an issue of contention between the governments. The numbers differed wildly also because of the scale at which the governments measured particulates and calculated their Air Quality Indexes (AQI), as well as significant disjuncture over the points at which grades of air quality were marked. For instance, at PM10 350, American scales log air pollution as 'hazardous,' while Chinese scales report 'light' pollution. But technically, the reporting and measurement conventions differed, and this was the crux of both the debate over transparency in environmental reporting and the *kind* of atmosphere and the kind of body-atmospheric relation that was deemed important to be known. While Chinese meteorological agencies reported concentration of PM10 particulates, at 10 microns, US embassy reports publicize concentration levels of the much finer lung-penetrating PM2.5, 2.5

micrometers, a measure of the tiniest ambient particles that thwart the body's filtering mechanisms and penetrate deep into vulnerable urban lungs and bloodstreams.

The major disparity in measures of 'the same air,' caused a popular uproar on Chinese social media and microblogging platforms. The difference between the two datasets, at its core, was not focused on the status of the Chinese state as a liar or manipulator of data although certain claims have been made about the Chinese state moving its measuring stations further and further from the perpetual traffic jam of the central city (Andrews 2008). Nor was it a matter of posing Chinese and American datasets against each other in the terms of a political battle between nations or political systems. It was rather a technical matter that hinged on how air affects the body.

While the US Embassy and the Chinese Ministry of Foreign Affairs debated over the appropriateness of American reports of Chinese air - largely interpreted by representatives of the Chinese government as an insulting infringement of the meteorological sovereignty of the Chinese government, who argued that "Beijing [Environmental Protection Bureau] should be the sole authoritative voice for making pronouncements on Beijing's air quality" (Wikileaks 2009) - American reporting of PM2.5 through @BeijingAir continued. That is, while the Chinese meteorological and foreign affairs authorities aimed to spin the matter of American reporting by mobilizing nationalist sentiment to dismiss American numbers, something else entirely was happening in social media and across the urban populace. The American particulate monitor drew the interest of Pan Shiyi, a billionaire real estate magnate. The numbers and standards took center stage, and while the Chinese government attempted to frame debate over the now widely-known US Embassy particulate monitor as a problem of bilateral relations, for Pan, the conflict between the two sets of air quality data did not play out at the macro-scale of international relations, but at the scale of the microscopic 7.5 microns between airborne particulates measured at 10 and 2.5.

In November of 2011, Pan Shiyi began reposting PM2.5 data released by the US Embassy, drawing attention to the difference between the two measurement standards to his more than seven million followers on Sina Weibo, China's most popular microblogging platform. The posts started a flame war on Weibo, where Du Shaozhong, head of the Beijing Environmental Protection Bureau, accused him of indulging in petty bickering (*koushui zhang*), to which Pan replied that he was not bickering with the state, but indeed expressing care and concern for "the elderly, the children, the families living in Beijing, in living environment (*shengcun huanjing*) of every Beijinger" (2011/11/1). He then began widely posting about the responsibility of the state to change its air quality standard and begin posting PM2.5, which, he explained, "is more harmful to the human body. Beijing Environmental Protection already has PM2.5 data […], it should start making it public, shouldn't it" (2011/11/3)?

Pan released on his Weibo feed a poll for his followers on whether or not they hoped the state integrate PM 2.5 into air quality standards. The poll ran:

> Experts say that PM2.5 air pollution is a great harm to the body. Only the national government can adopt mandatory standards which individual cities can then implement. Only knowing the seriousness of this problem can all people can work with awareness to combat air pollution, changing their own unhealthy lifestyles and habits. Please invite your friends to vote and forward this poll. After a week, I will take the results and write a letter to the minister of the State Environmental Protection Department.

At the end of its week, the poll had racked up more than 40,000 votes, with a full 98% of respondents supporting the adjustment of air quality standards to include PM2.5 measurements, with more than 90% demanding it immediately. The poll and the campaign for PM2.5, which many commentators consider the most consequential social media campaign in Chinese history, succeeded in making what just weeks before was an obscure minutia of air quality metrics into the protagonist in a sudden and ubiquitous pouring out of grievances over the air.

How are we to understand the charisma of PM2.5 which in the span of weeks had incited the air into discourse, and even direct grievances to the central government? The difference between PM10 and PM2.5 is not merely a question of the completeness of state measurement of the atmosphere or even a matter of an urban populace demanding transparent reporting. Indeed, in the 7.5 micron chasm between the two standard hung two visions of the air as a political substance.

Pan glossed the difference between PM10 and PM2.5, importantly, on the different ways in which they imbricated bodies in the air, where the finer measurement allowed for the air to be discussed as a cause of bodily harm over prolonged exposure through breathing. In a retrospective on the campaign in 2014, Pan describes his own education on particulate measurement, spurred by a perplexity over the disparity in Chinese and US Embassy measurements. His moment of revelation occurred when he understood, in discussions with scientists and politicians, that "the smaller the particles in air pollution, the greater harm they are to human bodies. Larger particles [like PM10] enter the nose but are then filtered out and so cannot enter our bodies, but smaller particulate matter can enter the lungs, and even smaller particles can even move through the lungs into the bloodstream, causing very large harm to body. This is the concept behind PM2.5" (Pan 2014).

It was the body's penetrability at stake, where breathing oscillated wildly between an innocuous vital process to a complicity in the relentless degradation of the body through its intake of particulates. If PM10 indicated a focus on what could generally be called the environment as an order of reality whose relation to human habitation is unclear, the feature of PM2.5 pollution that gained most traction with the Beijing populace was its capacity to afflict harm by entering the body through inhalation. PM2.5 gave a technical and political substantiation not only to the problem of the atmosphere, coming into view as a substance densely laden with suspended solids, but of the air in which one lived and had no choice to breathe as the inescapable medium of a repetitive injury. And more precisely, PM 2.5 not only shifted the air from a detached 'environmental' concern into the substance of a deeply embodied particulate exposure, but it revealed the populace of Beijing not merely as bodies that could be injured, but as breathers.

The demand for measurement of these particles precipitated, into a sudden frenzy of images of stunted breath, a diffuse urban affect around the open secret of the city's environmental woes. PM2.5 provided a rhetorical anchor for the expression of grievances over air quality, which overwhelmingly turned on images of vulnerable breathing bodies. Depictions of PM2.5, even in the state media, focus on its danger through inhalation, and alternate between descriptions of breathing particles – which was to say, living - as a medical threat and images of hospital wards packed beyond capacity with city residents complaining of respiratory problems. Prolific Chinese netizens, led by tycoons in the social media, were joined even by state-run media outlets that editorialized swift and satisfying government action lest popular discontent bubble over into more destabilizing effects. In mere weeks, over the 2012 Chinese New Year

holiday, the central government announced that it would begin collecting and disseminating PM2.5 data in major cities, a "New Year's Gift" to the people.

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City of Walls, City of Chambers

In such a condition of exposure, the air, on its worst days, drives the search for shelter for breathers. This revelation of the air's concentrations fomented another shift, wherein the city revealed itself as many interlocking airspaces, volumes of differentially breathable air that might be disconnected from one another to approximate a 'normal' breathing experience. The logic and engineering of self-contained airspaces for the re-naturalization of breath can be traced, at many scales, in a Beijing of airy enclosures and harbors from atmospheric calamity, made possible through technological mediation of body, architecture, world. Sloterdijk calls this entry of air and breathing into the field of intervention 'air design,' the "technological response to the phenomenological insight that human being-in-the-world is always and without exception present as a modification of 'being-in-the-air'" (2009:93). What city might be revealed when the city's monumental hyperbuildings and statement skyline dissolve out of view (Ong 2011, Koolhaas 2004), and when the hum of air filters and the blooming of facemasks carry the hope of insulating out so many breathing spaces in the Chinese capital? When a city of spectacular facades empties, mercifully, into containers of purified air?

Amidst a days-long bout of impenetrable haze in the spring of 2014, Xi Jinping walked outside, allowing himself to be photographed with a smile on his unmasked face. Part of a carefully planned spontaneity, the highest official in China allowed himself to be captured throwing in his lot with the common Beijinger. Xi's unprotected breath inaugurates a vision of residence in the Chinese capital as membership in a community of fate, held together not by citizenship but by the shared fact of exposure to toxic weather. The resolute nakedness of his face was announced in state media in the rarefied style of a couplet in officialese: "Breathing together, sharing a common destiny" (同呼吸，共命运 *tong huxi, gong mingyun*).

The partaking in this common destiny, in the unexpected poignancy of a high official breathing without a mask, is eked out in the steely determination of being outdoors, despite and against the dangers of the air's particulate load, which the US Embassy analogized to the smoke of a wildfire in its public safety materials[iv]. Exposure emerges as the condition of a shared fate, living and breathing the suspended signature of economic development as such: coal dust, factory emissions, vehicle exhaust. The spectacle of official breath aimed to reclaim the outside not simply as the stage of public life, but also as the literal substance of urban being. Increasingly, however, such a boundary between interiors and the exterior are becoming not only physically, but also conceptually, permeable, subject to renovation by particulates that sneak through cracks and penetrate walls. As aerosols hang heavily on windless days, even the 'outside' can be understood increasingly as the inside of an ever larger containment, where the mountain ranges surrounding the city and blocking or channeling air-flushing winds hold Beijing in a basin for the catchment of pollutants, so that the city's atmosphere itself becomes the first great interior out of which others are hollowed. Exteriors become massive interiors, and the city a mountain-walled, airlocked pocket of particulates, suspending and settling in the circulation of inside winds.

With such an enclosure, other enclosures balloon. Enclosure in a city where the Confucian compound and then the socialist work unit, *danwei*, generated a cellular urban form of walls and compounds (Bray 2005, Lu 2011), making Beijing long a city of walls that transect urban space in a serial, fractal elaboration. The conditioning of airspaces expands this subdivision of the urban plane up into three dimensions, cutting not only up from the ground but also across the sky; a city of walls cutting across space presaged a city of chambers scooped out of the air.

In early 2014, the Chinese Academy of Sciences submitted plans to build a massive indoor smog chamber facility in the city's Huairou District at the whopping cost of 500 million *renminbi*, US$81.4 million, to generate and simulate air pollution under controlled conditions for study. While certainly not the first smog chamber in the world, or in China (Wang et al. 2014), or even in Beijing (Wu et al. 2007), the project, announced as the largest in the world, was notable for its scale and its explicit link to the air pollution that it would replicate in the experimental containment of its massive chamber. The chamber, when built, will enable the study of atmospheric photochemical reactions in a variety of air conditions, through precise mechanisms for controlling the temperature and chemical and particulate composition of the experimental atmosphere which is then irradiated in order to establish reaction models (Wu 2007:250).

While the chamber must be understood as the technical implementation of a principle of air design, perhaps a distant descendant of Boyle's famous air pump, it should also be apprehended as a moment in which a clear distinction between the possibility of delimiting an absolute inside or outside erodes. The chamber works experimentally by promising the interchangeability of interior and exterior atmospheres, an indoor modeling of the erstwhile open. The massiveness of the smog chamber facility in Beijing is certainly a move in a politics of spectacle and scale, an extension of an political aesthetics in contemporary China where distinction is often offered in superlatives: biggest, highest, fastest.

But its size is also part of the methodological and epistemic exigencies of smog chamber research, where larger chambers allow, correspondingly, for the generation of atmospheres large enough to approximate the outside - an inside large enough to be an outside. Size is one way of reducing 'wall effect,' the disparity between 'real' air and its experimental approximation that can be linked to the fact of its containment, in the settlement of materials or reactivity of chamber walls; the technical reduction of wall effect - through ever larger chambers, through the use of materials and coatings, names the aspiration to obliterate the distinction between interior and exterior airs, or, better, to render each a permutation of atmospheric as a formal interiority. Wang Gengchen, a researcher at the Chinese Academy of Science's Institute of Atmospheric Physics notes, "The larger the smog chamber, the better its simulation quality" (Fang 2014), despite the other inconveniences of size (*Xinjing Bao* 2014) - like Borges' fantastic map, coinciding point for point with the space it represents (2004)[v]. Two atmospheres, then, not opposed as one contained and another open, or as original and simulation, but linked as iterations of one another: the city's atmosphere as the inside of a great smog chamber, a giant can of air.

Under the Dome

As air pollution wears on as a fact of life and breath in Beijing, conditioned airspaces become an increasingly important architectural form, perhaps someday to change the face of the city as much as the more spectacular boom in landmark buildings. While official attempts to clear the air have been embedded in a spectacular and technical politics for the control of

emissions, dust events, and ambient particulate suspension all around the city, atmospheric conditioning has become an increasingly commonplace strategy for creating and sheltering spaces of inhabitation in the city. If the creation of eco-villages outside of the major cities were a bid to gird Beijing's reputation as a forward-thinking environmental city (May 2011), the proliferation of airpsaces within the city might be understood as an inversion of this logic.

Air design has become an everyday practice, especially transforming domestic spaces into protected airspaces. Stoking a dream of final autonomy from the contingencies of airs, long a focus of the Chinese medical classics in which freedom from the wind was a deliverance from chaos of the unpredictable itself (Kuriyama 1994), an architecture of air conditions aims for a final autonomy of airs from one another through a technological extrication, and especially a fracture from the 'great air' (*daqi*) of the city. In a city of single children, the middle-class investment in the bodies and prospects of children (Anagnost 2004), especially, has seen schools and homes sites of a remaking, out of which a built environment in the air hollowed out.

In 2013, the International School of Beijing, a private school for the children of expatriates and wealthy Chinese, made headlines in the international presses when, in response to parent complaints and an exodus of expat families from the city, it erected a huge, pressurized dome over the school's outdoor playground so that children could play in an artificially-generated 'outside' on polluted days. Its promotional materials boast "two purpose-built sports and recreation domes enclosing six tennis courts and a wide range of indoor/outdoor sports and fitness areas. Both domes are situated side-by-side over 8,500 square meters. Throughout our campus, the highest standards of air quality are provided by a state-of-the-art air-filtration system" (http://www.isb.bj.edu.cn/page.cfm?p=514). Stories of such domes circulated in the international media as smug proof of the severity of the city's air problem, claiming that in the domed playground bubble 'childhood' itself might be delivered from the mortal danger of breathing (Wong 2013). On days where the official Air Quality Index spurs government warnings to reduce activity, and thus the need to breathe, such air-supported structures allowed for a normalized operation of the body through the maintenance of a secure, scrubbed atmosphere. Sourced from subsidiaries of companies in the US[vi], where they are used for the enclosure of stadiums, these massive synthetic skins use air itself as a construction material: they hold their shape and preserve air quality through the constant operation machinery for manipulating air's form and composition. After the air passes through filters and is expelled through the pressurizing fans that continually generate the dome's air-structure, air quality sensors register negligible levels of PM2.5 concentration, even when just beyond the enveloping walls of the dome, numbers are so high as to be off the charts.

The enclosure of outdoor areas against outdoor air occurs at the confluence of disparate elements and processes. While for now, the air domes remain mostly in private schools one-upping each other for enrollment of the urban wealthy, their logic of enclosure and filtration is becoming much more ubiquitous, filtering down as a concern of the anxious rich to a broader middle class problem. Where just years ago, air filters were a privilege of the rich at the hefty price of up to 11,000 *yuan*, companies like SmartAir and its many copycats, which sell cheap DIY filter kits for rooms, have made filtered air much more attainable. SmartAir, founded in 2013 by Thomas Talhelm, a PhD student in Beijing from UVA, and a group of Chinese and American friends, sells economical room filters, which consist essentially in strapping a HEPA filter to an inexpensive fan, tamping down the price of a filter from almost US$2000 to US$20. They have found a huge consumer market, and the company reports spikes in sales that correspond closely with AQI readings in major Chinese cities[vii].

Where air domes work through the pressurization of air to bubble airspaces out against the sky, filtration technologies allow the conditioning of any room into such an airspace. Filter technologies begin from the problem of indoor air rather than air quality writ large, especially the suspicion, borne out through pocket air quality measurement devices, that even indoors, the air is not safe. In this, they operate at the much more concrete interface of body and highly localized breathing environment and aim to create intermittent pockets of cleaned air. Rather than clearing the entire atmosphere, filters allow for the multiplication of smaller breathing spaces carved out one room at a time, to create a pocket of breathing space that surrounds the body rather as a microsphere hugging close to the mouth and nose. They facilitate the transformation of rooms into containers and, through the fan-driven forcing of air through filters, they indicate a body always too much in the world, safe not even in the deep interiors of unfiltered domestic space. Where the air threatens, this body extends past the porous wall of the skin into the arrest of the wind. Filtered air and filtered airspaces promise, then, an escape from the environment in which one must live, a small re-establishment of the body as a hard inside delivered from particulate exposure.

Personal Bubble

In a city of dangerous airs, there is a contemporary resonance with the fretted interrelation of body and atmosphere in classical Chinese medicine, where, as medical historian Shigehisa Kuriyama reminds us, the body coalesces fleetingly as an inverted pocket of air, in or out of sync with its macrocosm. "The nature of the self that slipped out of phase," like the environment of which it emerges, "was itself windlike" (1994:33), a sleeve of energetic airs penetrated through the pores that exposed it to the vagaries of a chaotic atmosphere. Escaping the wind, then, was the aspiration a way of embodiment removed from the environment to which it remains problematically attached and definitionally vulnerable.

In a city of conditioned airspaces, it is not architecture as such that is at stake, but the fractal elaboration of airspaces. Architecture works as one means for creating and delimiting volumes, but ultimately, this practice of insulation is not focused on space, but on the body's existence in air. A filtered room, a smoke chamber, a face hidden behind a mask are iterations of the formal template of the purified lung-space, a space that definitely exceeds the skin-boundary of the body proper (Scheper-Hughes and Lock 2007). The breathing body, assembled out of classical Chinese medical philosophy's investment in a conception of the body in its environment, and contemporary thematizations of the atmosphere as a dangerous breathed medium, is itself an airspace of breathed substances that surrounds the skin. These volumes must thus be understood as the encasement of the lungs, at different embodied and architectural scales, in small spheres of atmospheric shelter, safe harbor from "the defenselessness of breathing" (Canetti 1979).

Holding the lungs apart from the air, to which they are subjugated by the autonomic impulse to breath, is thus to create airspaces that armor the body from danger. This sees the final realization not merely of the city, but of the individual body, as a conditioned and designed airspace, a mobile lung that carries its airy shelter with it like a hermit crab carries its shell. Separating air from air is an insulation of the body from its own need to breathe, deepening the exposure breath by unavoidable breath. From the massive dome to the can of air, air design here seeks not merely, as Sloterdijk proposes, to subtly condition behavior as through an aether, but to

make and hold spaces in which urban breathers might dwell and traverse. Techniques of the body include prosthesis in which it generates and becomes the generator of its own airspace[viii].

On heavily polluted days, facemasks bloom as if by cue on the urban peoplescape, a fabric barrier between outer and bodily airs. Since 2011, city residents flooded social media with facemask selfies, holding placards reading "#I don't want to be a human vacuum cleaner," (#我不要做人肉吸尘器)[ix]. In this image of cyborg appropriation through breath, bodies themselves could dissembled into component parts and reassembled beyond the sheath of the skin. Polluted air refashioned respiratory organs into organic machines turned against the bodies they no longer referred to. The autonomic, irrepressible demand to inhalation makes the aggregate of city breathers into a dispersed biotic mechanism of a great, debilitating, air filtration device, which cycles the atmosphere through the urban populace. As such, a breather "becomes at once a victim and an unwilling accomplice in his own annihilation" (Sloterdijk 2009:23). To breathe then is both a necessity for life and an erosion of it. In such dangerous air, breath facilitates the dispossession of the body from itself, giving an image of an urban populace as a collection of disembodied respiratory systems, threaded together by inhalation of the city's air.

Masks offer a first and last line of protection in the spaces of transit that limn and separate filtered rooms. If domes and chambers rise as intermittent waystations of air, facemasks allow for a last mobile pocket of protected breath in the cavity between the mask and the threshold of the respiratory tract. They might be apprehended less as simply a barrier but as a wearable technology through which a breather enters into a more salubrious cyborg relation to the air than that of a 'human vacuum cleaner.' A facemask's sheath of material works not simply by blocking suspended particulates, but more precisely, by making the perpetual motion of inhalation into a dynamo for a lo-tech filtration system that aims to approximate the fans and filters through which rooms are made to be more inhabitable.

If de Certeau argues that walking in the city liberates space and make habitation possible (2011:162), for besieged, bemasked breathers, walking in the city is also an exposure to the slow suicide of exposure. Walking relies on a recoding of the body into a technical apparatus for its own protection. In such strange weather, a walker in the city avoids exposure and seeks shelter even when traversing through the open air of a great closed atmosphere: myself, one airspace passing through others, splintered off into a tight-fitting bubble. But here, as elsewhere, the promise of hermetic separation falters. Suspicion lurks over whether or not a space can ever be cleaved off fully enough from another, whether or not windows can seal tightly enough against the outside, or whether the tight mesh of a mask truly captures enough; for in a city occupied and remade as a series of volumes within volumes airspaces are never well enough closed from one another, for air conditioning is a response to a psychic atmosphere as much as a physical one.

Air conditioning and design remain tactics and an ensemble of environmental techniques, responses to the fraught dependence of the body on air, any air. It is never, however, finally a fact, and in the yawning hollows of a Beijing re-engineered into breathing spaces and traced out by the amble of so many masked breathers.

On Chinese Breathing

> Who needs to take steps to reduce exposure when PM2.5 levels are "hazardous" or above on the AQI?

- Everyone needs to take steps to protect themselves when pollution levels are "hazardous" and above. Some people are at higher risk from PM2.5 exposure. People most at risk from particle pollution exposure include those with heart or lung disease (including asthma and chronic obstructive pulmonary disease-COPD), older adults, and children. Research indicates that pregnant women, newborns, and people with certain health conditions, such as obesity or diabetes, also may be more susceptible to PM-related effects.

Xi Jinping, breathing unmasked, aimed to conjure a vision of urban belonging as a pneumatic collectivity, where 'breathing together' is a gesture at a common fate that might be held to be Chinese. If it is indeed the case that the general atmosphere, under particulate stress, is being made to break down into so many bubbles, airy sleeves for breathing individuals, what possibility of a collective – one named by the state, no less - might hang in shared breath? Sudden social movement over PM2.5 measurement in 2011 and 2012 seemed to foment the sudden formation of a breathing public online and on the street, one that for its particular focus on transparency of information seemed to spell the coming formation a nascent civil society long anticipated by the west (Wang 2013:159), a precursor to the final erosion of the political status quo for a teleological democracy.

While air quality debates might be discussed through the formation of a proto-democratic civil society composed of citizens seeking knowledge to hold the state accountable in a Chinese echo of a Habermasian public, it might be more instructive to consider the centrality of breathing to the political thing at hand. Breathing animated a city populace that was to air its grievances as an aggregate of what Tim Choy calls 'breathers' (Choy 2010), an identification of urban life with the autonomic processes that sustain it. And to be breather, here, was to give the outlines of a specific vision of not-yet-political collectivity defined *not* by its agency, as in accounts of the event either as the reanimation of the revolutionary People or as the spontaneous self-organization of an early anticipated public sphere in China.

Such a collective of breathers tempts with a formal resemblance with a vision of The People, *renmin*, central to Maoist mobilizational politics. Mun Young Cho, in her discussion of the urban poor in northeast China, considers the passing of The People, the privileged and empowered political collectivity and subject of Chinese socialism, into a 'population' subject to technocratic intervention and management. Two visions of political collectivity contend, defining two poles of a typology of social forms structured by agency and its absence: one the muscular embodiment of ideologically corrected popular will, and one a patient on which power acts. In Cho's account, The People returns, spectrally, to animate a political morality seemingly anachronistic to this moment in the disjointed time of the nation. Is the aggregate of 'human vacuum cleaners' a return of The People? To ask is to ask how a condition of exposure upsets a binary of agency and passivity.

Urban coughs might be heard as the self-interpellation of a new site of political-bodily investments. But what this thing is must be tracked through breathing itself as an autonomic process that runs askance of a binary between agency and passivity. It is precisely that breathing is neither something that one does, *per se*, but neither is it passive in the sense of a not-doing. If breathing shaped an emergent political actor, it did so through a strange negation of agency, linked with the incapacity of exposure as a bodily and political condition. This political actor does not act in a positive or negative way, but rather the automaticity of breathing conditions a way of thinking through double negatives. Breathing is that which one cannot not do. To breathe is thus not an assertion of the body's agencies, or the capacities of a collective, but rather the possibility of its dispossession through its own processes in the proper – wrong, violent –

atmospheric conditions. If we return to deployments of the people as an extended network of living air filtration devices, or as vacuum cleaners made of human flesh (*renrou xichenqi*) an aggregated populace of breathers emerged through a dispossession of capacities through exposure to the air. In this exposure, not only were individual breathing bodies assembled through the dense air, but bodies themselves could dissembled into component parts and reassembled beyond the sheath of the skin. Air refashioned respiratory organs into organic machines, elements of an atmospheric device that decentered and dispossesses the body of its agencies.

What of the breathing body, then? "Chinese breathing" holds a strange place in the anthropology of the body. Marcel Mauss, in his seminal paper on 'Techniques of the Body,' understood 'breathing techniques in particular,' central to the disciplinary and mystical practices of Daoism, to be 'the basic aspect' in China (2007:68). In a reflection that founds the capture of 'the body' as an anthropological object, attention to Chinese breathing bolsters Mauss's claim that "[i]t is thanks to society that there is the certainty of pre-prepared movements, domination of the conscious over emotion and unconsciousness" (2007:67). Chinese breathing for Mauss founds a more general subsumption of the body into the order of the social, the conversion of the most automatic of processes, through consciousness or culture, into anthropological objects. Lock and Farquhar's reflect on Chinese breathing disciplines to argue that "even the most foundational physiological processes can be subject to deeply formative training" (2007:187). Chinese breath founds an anthropology of the body that transitions bare physiology into cultural fact, and into conscious manipulation.

Might exposure through the breath offer an anthropology of the body, and a politics through environmental embodiment, an opening to the body beyond its status as 'cultural'? Elias Canetti, writing of his friend, the author Hermann Broch, asks, "Can we actually conceive of a literature that stems from the experience of breathing?" (1979:10) The very form of his question hints at the uncanniness of an attention to breath, an experience that is so automatic that naming it renders it strange to itself. Is breathing an act? What historical event sees breathing shift into the register of 'experience'? What has become of the breath, when "a sustained mindfulness of the air's breathability" (Sloterdijk 2009:84) has supplanted its autonomic repetition? Canetti's account vibrates with the aftermaths of gas warfare in the Great War, where breathing makes bodies unwitting accomplices in their own undoing. At its core, in these changed atmospheric times, breathing emerges as a "defenselessness," for "[t]o nothing is man *(sic)* more open than the air" (Canetti 1979).

If Canetti considers a literature founded on the breath, we might ask of an anthropology and a politics that likewise 'stems from the experience of breathing' in a particulate milieu where breathing itself has become 'an experience.' At stake is an attention to the remakings of breath, and how its entry into attention invites a reflection on the illegibility of a politics stemming from bodies rendered defenseless by life in the air. Exposure through breathing, neither active nor passive, might generate a vision of collectivity outside of The People, for breath hovers in a grey zone between action and automaticity, reflection and reflex.

*****

Wu, or, Where Weather Ends

In late imperial China, the weather itself could be interpreted as a divine missive, commentary on the state of earthly affairs, and especially the conduct of the emperor. The weather, that is, quivered with political significance and atmospheric interpretation bound meteorology to morality (Elvin 1998). What has become of the weather? In Chinese, the words for fog and pollution are both *wu*, distinguished only by a difference in tone. If once, the phonemic near-miss indicated a chasm in meaning, two theories of atmosphere and its causation, perhaps, as living in the city becomes inseparable from escaping its air, such a distinction is fading into the concentrations and particulate densities that have made themselves the objects of contemporary meteorology. Fog and pollution, meteorology and manmade pollutants do not differentiate the atmosphere into sectors but rather assemble and describe a composition that has tremendous effects for life and politics in the city. In a Beijing arrested by the density of its own atmosphere, the determination of what may or may not still qualify as the weather is becoming secondary, slowly giving way to a search for shelter from the air. City life becomes a constant process of escape to hollowed air. And while the sky thickens, the two *wu*s come together in the city where the weather ends, where the soft echo of a cough punctures the still of the night before dissipating into the city fog.

Section III

Downwind: Airspaces of a Dusty Continent

China's rise has been articulated as the proliferation of new flows and networks in the process of a re-Opening after the long diplomatic and economic isolation after the Sino-Soviet Split. Today, if a densification of economic, political, and cultural ties are tying China with its outsides, the emergence of China as an ecological actor has been an uncanny material reminder of the ways in which the fates of China and the planet are intertwined. Where China contributes to the planet's atmosphere in its tremendous carbon footprint or shapes the meteorological condition of places in its windy shadow, today, much of the world is downwind from the Chinese miracle and its ecological fallouts.

Questions of airspace and atmospheric regionalism proliferate in this moments. Air and its relation to land remain a fraught question in the contestation over sovereign claims in Asia, raising questions not only of the relationships between military and civil airspace over the Chinese continent (Fallows 2013), but also its presence as an atmospheric sovereignty vis-à-vis its Asian neighbors. The establishment of an Air Defense Identification Zone by the Chinese state over the East China Sea in 2013 made air traffic control a medium through which a quasi-territorial claim over airspace could be elaborated. Current attempts at island-building in the South China Sea have been a technique for establishing a territorial claim to the air and sea, through questionable cartographic claims. Air and land, here, are the elements of a 'politics of verticality' (Weizman 2012) through which territorial claims provide the shaky material and legal basis for atmospheric ones. These events have raised questions over the relationship between air and land in claims to political sovereignty. In each, the air appears as a volume whose borders can be delimited, as if rising like a prism from the surface of the land or ocean. Airspaces, with tight boundaries that can be crossed, whether with reference to land or not, have become an important site in which the Chinese state has experimented over and asserted its claims as a regional power. Air is a containment, a fixed volume shooting up from borders etched and built onto the planet below.

In what sense, in a dust storm, is air a space? How, in their movements, do dust storms anchor airspace as a flowing trajectory, where air a mobile link between places rather than a staid quantity that can be divided into pieces? It has become a commonplace that air, climate, and weather do not respect political borders. We may reframe the question, veering away from the bland celebration of spatial transgression through which the ubiquitous no-space of a single interconnected earth replaces the petty chauvinisms of sovereignty. Rather here, I ask how, in its motion, does a mobile atmosphere, heavy with airborne materials, create new problems and foment new ways of imagining and assembling political relation in space? Where land-like claims over air have been a strange site in which contemporary regional claims to territory and zones of control can be elaborated, along the path of a storm, other modes of relation across space and other ways of articulating with a political atmospheres might open.

In this final chapter, we follow the dust as it moves beyond China's borders. The finest dusts can stay in indefinite suspension given felicitous aeolian conditions, and so, 'Chinese dusts,' as they flow on the wind, draw places together while also literally moving land and air into new configurations. Airspace and the condition of being downwind – in Korea, or in the US – open again land and territory to new questions. The trail of a dusty continent can be traced through the wind.

Chapter 5: The Pacific Dust Express: Meteorological Asias

The Same Storm

When former Ambassador Kwon Byung-Hyun speaks of the 22 kilometer wall of trees that has occupied him since stepping down, he tells a story. He recounts that in 1998, while he was serving as the first South Korean ambassador to the People's Republic of China after the re-normalization of diplomatic relations, Beijing was swept in an usually severe dust storm, the first of many during his tenure. The pall of dust in the city affected his health, as it did for many denizens of the city, who were advised to wait for the dust to pass indoors. The next day, at the diplomatic offices in Beijing, he received a phone call from his daughter in Seoul. She complained of a bout of Yellow Dust over the Korean capital, the treacherous *hwangsa*[14] that afflicted springtime Korea. This time, *hwangsa* in Seoul was severe enough that it led to a spike in hospitalizations in Korea as well as the mandatory closure of schools across Seoul.

"I realized she was talking about the same storm I had just witnessed," he recounted in a 2012 interview. "I saw for the first time that we all confronted a common problem that transcends national boundaries." It was at that moment, which he describes in the language of a dust-shocked epiphany, that he came to a yawning realization about China and Korea, not simply as neighboring countries, but as first and second in a dusty sequence. . Kwon and his daughter, separated by a day's dust-time and a sea that divides two countries, are nonetheless gathered in the intermittent span of a meteorological event. As he orchestrated opening political ties, the dust storm made environmental ties obvious as another modality of international connection. The two countries share no land borders; while separated by the Yellow Sea they are also held together in the movement of Yellow Dust. This *hwangsa*, coursing toward loved ones abroad, also gathered suspended pollutants in China mixing them into its turbulent composition. Kwon later saw that moment, stretched over days, as a "turning point" (2010:35): Beijing and Seoul were not simply two capital cities of states at the threshold of a political reopening. They were also two points in the path of the movement of a cloud of particulates, one day apart by dusts in the wind.

As first ambassador, Kwon began work within the international relations setting of Northeast Asia to elaborate another regional vision of Asia, one that would take the movements of dusty wind as its template. For Kwon, dust was both a challenge for Asia, and not simply China, as well as the very form through which another Asia might elaborate itself. In 2000, Kwon, with cooperation from the China Youth League, and with political and corporate support from Korea, broke ground on a Chinese-Korean Friendship Forest (*zhong-han youyi lin*) that would eventually stretch for 30 kilometers in a line on the eastern side of China's Kubuqi Desert, to be managed by a new NGO with twin offices in Beijing and Seoul: Future Forest (*Weilai Lin/ Mirae Sup*). Twelve years into the project, his son explains, when we meet in the Beijing headquarters, that the location of this 'Great Green Wall' is strategic. It is close enough to Beijing – just an overnight train away – that it is convenient to supply and also to bring Korean

[14] *Hwangsa*, in Korean, is cognate to the Chinese *huangsha*, yellow dust, but in Korea, refers specifically to spring dust events that pass over the Korean peninsula. The two phrases, however, are written differently in Chinese characters in China and South Korea, where the Chinese *sha* 沙, dust or sand is written with the water radical, emphasizing the absence of water, while in Korean, *sa* 砂 incorporates the stone radical, to emphasize the geological character of sands and dusts. In this chapter, the Korean *hwangsa* is used to refer to the Korea-specific version of dust storms, which emphasizes both its seasonality and its transborder sweep.

guests in, and because of his father's political connections in China, it had received the hearty support of the All-China Youth League in Inner Mongolia.

But more importantly, the site was arranged at the farthest eastern expanse of a dust source area that threaded through both Beijing and Seoul. The desert was a spot in the wind, a place at which Korean and Chinese groups might make a final stand against the dust-transporting wind before it passed through Beijing, then Seoul. Gesturing at a map of Northeast Asia in a Powerpoint Presentation he prepared for Korean NGO groups, he points at a Seoul where a series of arrows designating dust-transporting airstreams converge (figure 1). Tracing these arrows back, through Beijing, he hovers at the point they have chosen as a planting site in the Kubuqi desert. "These arrows are the lines that carry *hwangsa* through Beijing to Seoul." At the planting site, there is a vertical line that indicates the positioning of the Friendship Forest they aim to build, erected perpendicular to the channels of the wind. With a downward thrust of his hand, like a blade cutting through the wind's thread, he says, "This wall will be a first line of defense against the dust, for both Beijing and Korea." It will be a living knife that severs the dusty airstreams that make a floating bridge between the countries and beyond: from the Kubuqi to Beijing as a dust storm, *shachenbao*, a day from Beijing to Seoul as *hwangsa*, another day to Japan as *kosa*, or another week or so to the United States where it becomes simply "Asian dust" (Tratt et al. 2001).

Figure 18: Future Forest's training materials depict the location of its "Great Green Wall" in relation to regional wind currents. Korea is obscured and fully covered by a fan of arrows indicating the routes of dust storms.

As political opening and environmental threat coincide in time, for Korean planting groups the problem of 'Asia' looms at the non-isomorphic intersection between political,

economic, and meteorological spaces and scales. For to Korea, in dust storms China is many things: a source of atmospheric trouble, an environment that must be protected but which one must also protect oneself from, an emerging regional superpower, a meteorological problem. Chinese sands are part of the Korean national airshed, and along the speed and course of the spring wind, one country's exposed earth is another's coming storm. For both the elder and younger Kwon, desertification must be understood as a problem for Asia at large, out of which a regional vision and cooperation are necessary. In reflection, the ambassador writes, "I had made up my mind that the spread of deserts in Northeast Asia was the issue of our age and I promised that I would bring the resources, and the know-how, from Korea needed to address" it. But what is the Northeast Asia that is so imperiled, and how does it animate the plantings that protect downwind 'Asia' from the wayward dusts of a Chinese environment in disarray?

This chapter asks what Asia looms in this wind. In the elder Kwon's words, "Although the environment links China and Korea together closely, and we share an ecological continuum, both sides tend to think that responsibility ends at the political border." His task is to put forward a vision of Asia by mining the dust for new figures of international relation. The future forest that the Kwon's have devoted themselves to exists as a local materialization of an emergent Asian vision, rutted out as a dense entanglement of political and meteorological geographies at the beginning of the 21st century. I argue that, where tree-walls are constructed in hope of protecting those two days away, these windbreaks are the on-the-ground materialization of a novel conception of Asia, not as contiguous and spatially discontinuous landmasses brought into 'international relations,' but as a vectorial and eventlike space in a region that has and will be an ecological continuum. Countries are porous to one another by their very position in the air.

The vision of 'Asia' formulated at the edge of spreading deserts deep into China is an Asia above ground. The spatialization that tree-walls are planted in response to is a vision of Asia that is tracked to the movements of winds and dusts rather than to the fixities of a political cartographic imaginary. It is space of variegated environmental responsibilities and exposures, sorted by the wind's path into upwind and downwind places. As dust storms mutate political ties into meteorological ones, we may have pause for thinking about situated planetary - in addition to global - assemblages (Collier and Ong 2005) in a region whose gazed has turned to the sky.

Vectorial Asia: Sequential Placings

> So you see how Asia is not just a problematic, but it's a problem, and so for us to really understand how it is a whole collection of positions without identity and going back and forth, we have to step out of regionalisms.
>
> -Gayatri Spivak
> (Yan 2007:434)

As the apparent gravity center of the 21st century shifts east, much scholarly attention has been directed at opening anew the question of Asia (Yan & Vukovich 2007). Contemporary attempts at specifying the terms of intra-Asian relation contend with the fraught genealogy of Asia as a cartographic and civilization fiction, which scholar of the Chinese New Left Wang Hui has argued, is first and foremost a European invention, coming out of 18th century European philosophical accounts of universal history. In search of the coordinate of an Asia that arises from Asia, Wang derides 'Asian' Asias derivative of European political and philosophical

thought, especially Imperial Japan's definition of a Great East Asia Co-Prosperity Sphere as the natural regional growing space for the expansion of a Japan-centric Asia. Attempts at sloughing off this orientalist tradition, however, contend with the danger of invoking "an essential, ontologically pure Asia as self-evident, self-sufficient, and self-made" (Yan & Vukokich 2007). Indeed, meteorology itself has offered an environmental determinist framework for defining a coherent geographic object of study in the Asian Studies tradition in American area studies, in the figure of a "Monsoon Asia".

However, as Cold War divisions give way to intensifying cross-border networks, it appears that an Asia, interpellated by global forms and forces, may be coming into its own, without reference to the co-evolution of culture and weather as it is presented in such approaches, reminiscent of mid-century ecological anthropologies. Spivak's posing of Asia as a problem, to be worked out without reference to a primordial identification with a cartographic fiction of 'region' is to consider Asia as a series of practices, aspirations, and attempts at creating the conditions of a collectivity that could be regional, without being primordial. 'Asian' proto-solidarity has been located in multilateral organizations, for instance in ASEAN or the Shanghai Six, or in multiparty talks on North Korean disarmament which have included the US, that tantalize commentators as the framework for an incipient Asian regionalist collectivity. While international relations scholars busy themselves looking for Asian analogs that suggest a coming EU-style regionalization, Aihwa Ong directs analytic attention instead at tracking how specific political strategies aim to create strategic transborder networks. She homes in on administrative techniques of zoning across Asia that have allowed for a "creative respatialization of the national territory" (2006:98), a flexibilization of national territory to create and capture cross-border flows. Chinese deployment of zoning technologies seek, through the creation of transborder dynamics, to foment the emergence of complex networks across space, binding regions economically where political integration is prohibitive (108-109).

While diplomats and international relations experts attempt to realize a regionalism through high-level talks, Ong points to an Asia bubbling into spaces that depend on territorializing strategies and yet do not cohere to any conventional notion of territory. The Asia that appears in the stitching together and opening up of new relations across space both depends on and reorganizes sovereignty, shifting it from container concept into supple strategies and deployments of space. Elsewhere, Ong tracks recent enactments of Asia as a continuity of human matter that scales up and down across space, as when multiracial Singapore becomes a fractal stand-in for a genomic Asia at large (Ong forthcoming).

Rather than taking the spatial determinants of political claims for granted as context, Ong tracks the various ways in which Asia is invoked, recoded, and deployed, often in terms that subvert or circumvent classical problematics of nationhood and international relations. 'Asia' and region more generally are both an analytic and ethnographic thing here: they name both specific schemas of relationship between spaces and peoples *and* they are a strategic medium through which claims to other kinds of relation can be made. That Asia can be activated as a framework not simply of political relations between spaces or trade relations between distinct economies, but as a shifting configuration of densifying and weakening ties, or as a demographic continent of shared biological substances is a clue. It shifts Asia from a space of identities to a spatialization through positions, many spaces that can be composed through many different substrates.

In the Future Forest offices in Beijing and Seoul, as well as other Seoul-based anti-desertification NGOs, it is the geography of dust storm origins and exposures through which

another Asia takes form. Kwon's son produces many maps that illustrate a susceptibility, by mere geographic position, of Korea to Chinese desertification, and in doing so, he elaborates meteorological exposure as a complex grounds through which international relations must be rethought in the interest of international friendship and also ecological shielding of both Chinese and Korean sites from the worst effects of desertification. He produces a map that illustrates the movement of a 2006 dust storm with a straight arrow from the Kubuqi Desert through Beijing and finally Seoul (figure). The map is accompanied by three images that illustrate the dust event as it moves through these serial sites, timestamped on consecutive days, the 8th, 9th, and 10th-11th of April.

Figure 19: Future Forest's Visualization of a storm in time and space.

The arrow of a storm is crucial to the vision of Asia as a meteorological process. It is these arrows in their multiple iterations that are crucial to grasping the irreducibility of the spatial reckoning through which Korean anti-desertification groups present the relationship between various places in China and Korea to the conventional international relations imaginary of earthbound territorial sovereignties rubbing up in horizontal space. Tree-walls, rooted firmly in the earth, look up. They are a response to the powers of the air and sky. While Future Forest's wind and dust maps conjure a China and Korea that appear, quite startling, as the background to the movement of the storm, the maps through which other organizations in Korea explain their involvement in China illustrate the reorganization of political into meteorological relations more directly. In a pamphlet the Seoul-based shrub-planting group Ecopeace Asia defines the need for Koreans to protect themselves from Yellow Dust by addressing the problem at its root in China, because "we [in Korea] cannot cover the sky with dust-proof blankets" (Park 2011:3). The

organization uses another map of dust routes to present a Korea embattled by winds, promoting a sense of an atmospheric Korea that goes far beyond its borders, demanding intervention in places understood in the same region – rather than in other countries (figure 19).

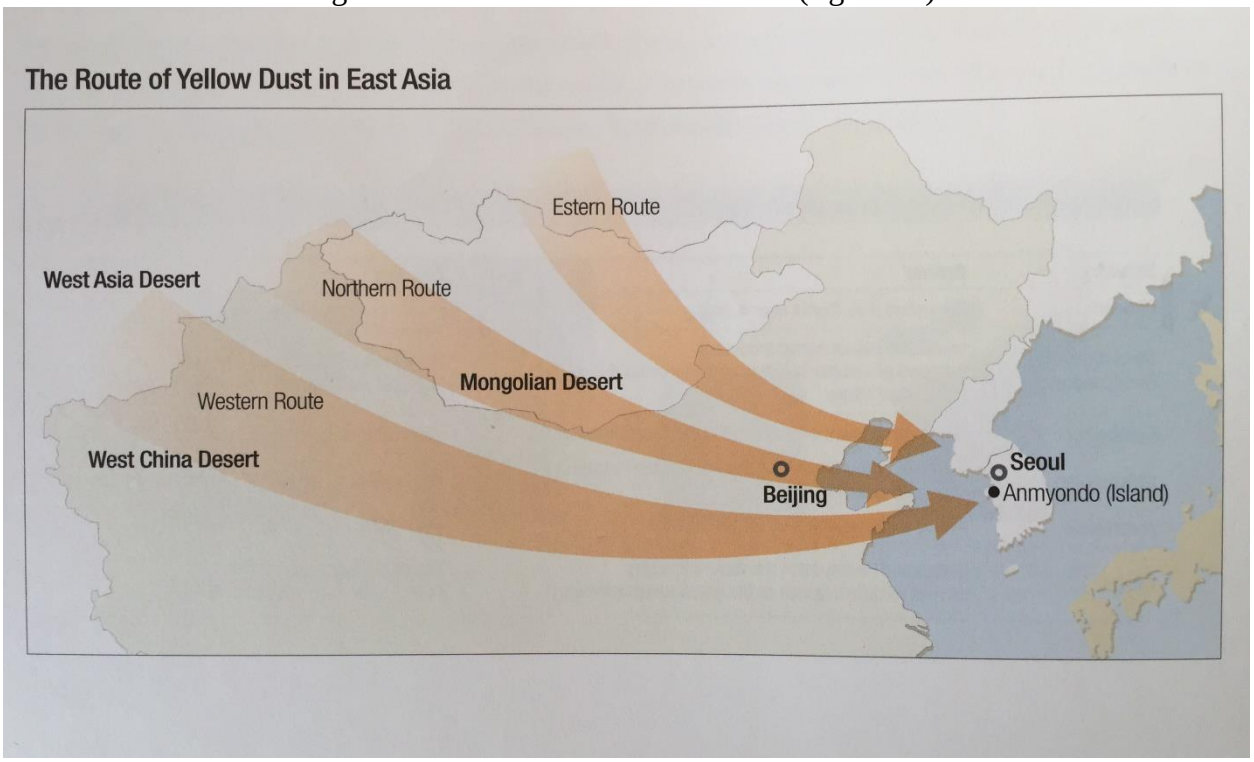

Figure 19: Routes of Yellow Dust in East asia

The terrain features of other maps have disappeared in favor of three smooth arrows mapping western, northern, and eastern routes of yellow dust. Where Future Forest's sandstorms arrows fan out from a single point in China, EcoPeace Asia's map features these three route-arrows converging near a single point around Seoul. Each focuses on Korea with a barrage of arrows. The "China-born Yellow dust" is described in criminological idiom as a "public enemy that invades Korea every spring" (2011:13).

Figure 20: Asian Dust Sources and Destinations.

In scientific visualizations of the movement of dust clouds from Inner China over time across the Pacific, places on the map become serial footprints-in-time, places beneath what is represented cartographically as an airborne landmass that doubles and obscures what is below (figure). Central to the epistemological intervention of all these maps is the reorganization of cartographic into meteorological space, defined by motion over time. Dust episodes reorganize the international relations of China and the Republic of Korea into the source and eventual channel for a meteorological event. In dust, China and Korea occupy respective positions of inflicting and afflicted places in the geography of a meteorological event that both evokes and rejects a given framework of bilateral relations between sovereign states. Polygons and arrows contend as different modalities of spatialization. While Ong's zonings territorialize new subregions through administrative techniques and unilateral political action, here, the mapping of dust storm movements indicate not only new spatial formations, but a space of a different nature from the cartographic containers that they are drawn over. This difference between spatial orders is not a binary but instead, two ways of reckoning space, each a transformation of the other. This difference can be related to what Deleuze and Guattari call smooth and striated spaces, mobile "nomad space" released into trajectory and "sedentary spaces" proper to the organizational impulse of a State-apparatus. These forms of space are "not of the same nature," but "in fact exist only in mixture: smooth space is constantly being translated, transversed into a striated

space; striated space is constantly being reversed, returned to a smooth space" (1987).

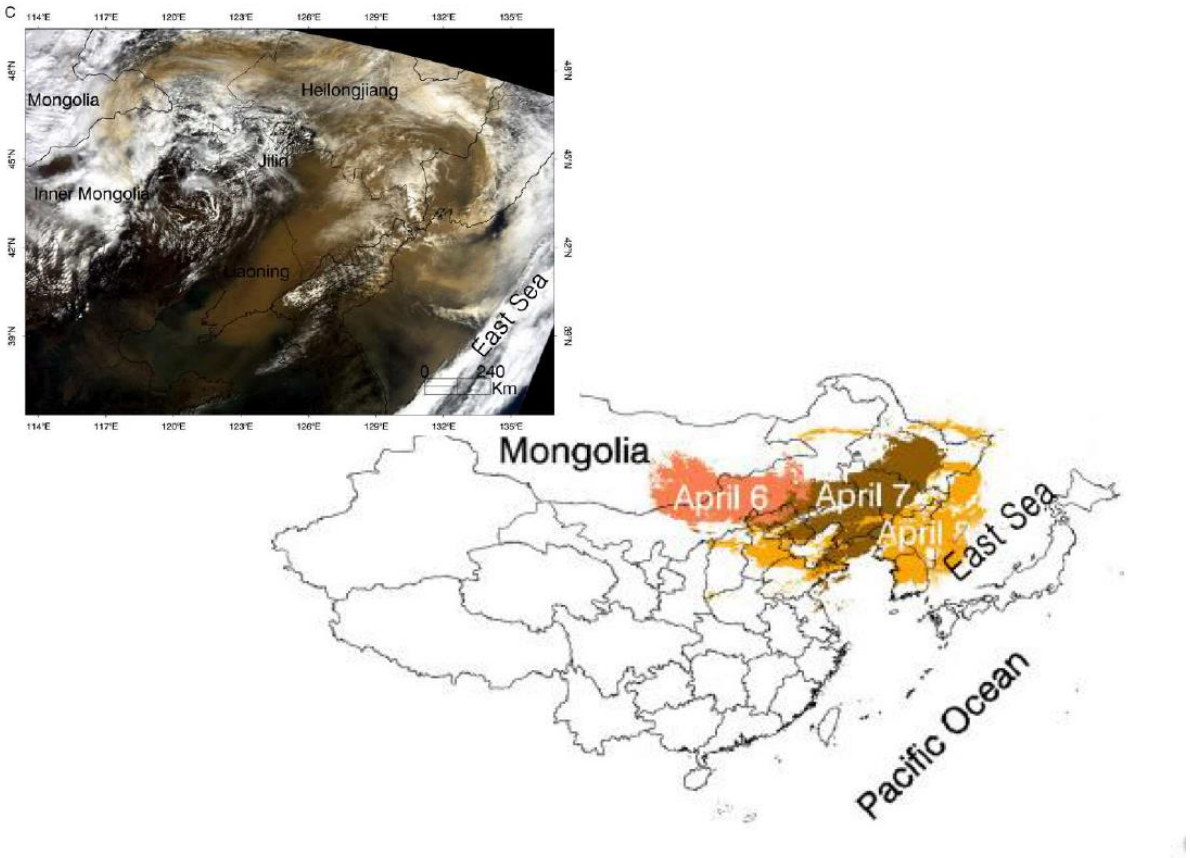

Figure 21: A floating continent in time

The Asia that emerges out of a sense of Korean meteorological vulnerability to its upwind neighbor is tracked to the arrows that skim their way across it: it is an Asia composed not out of landmasses but vectors, lines with magnitude – velocity – and, crucially, direction. Territories are pathways, and rather than the privileging of spatial relations between pre-given entities, a vectorial conception of Asia reorganizes spatial relations wholesale. Places can thus be thought of sequentially in space and time, where Beijing and Seoul are not simply two places in abstract space, but a before and an after, a relative first and a second in an order. It is this vectorial quality that generates and differentiates positions internal to the dust storms path, and where specific places are sorted out and then related to each other relative to wind's motion. In this way, places are not related as points on a plane, as in the diplomatic relations between sovereign states that ex-Ambassador Kwon served to build. Rather, the dust storm path offers its own linear-spatial template wherein spaces are temporalized, measured in days of irreversible time (figure).

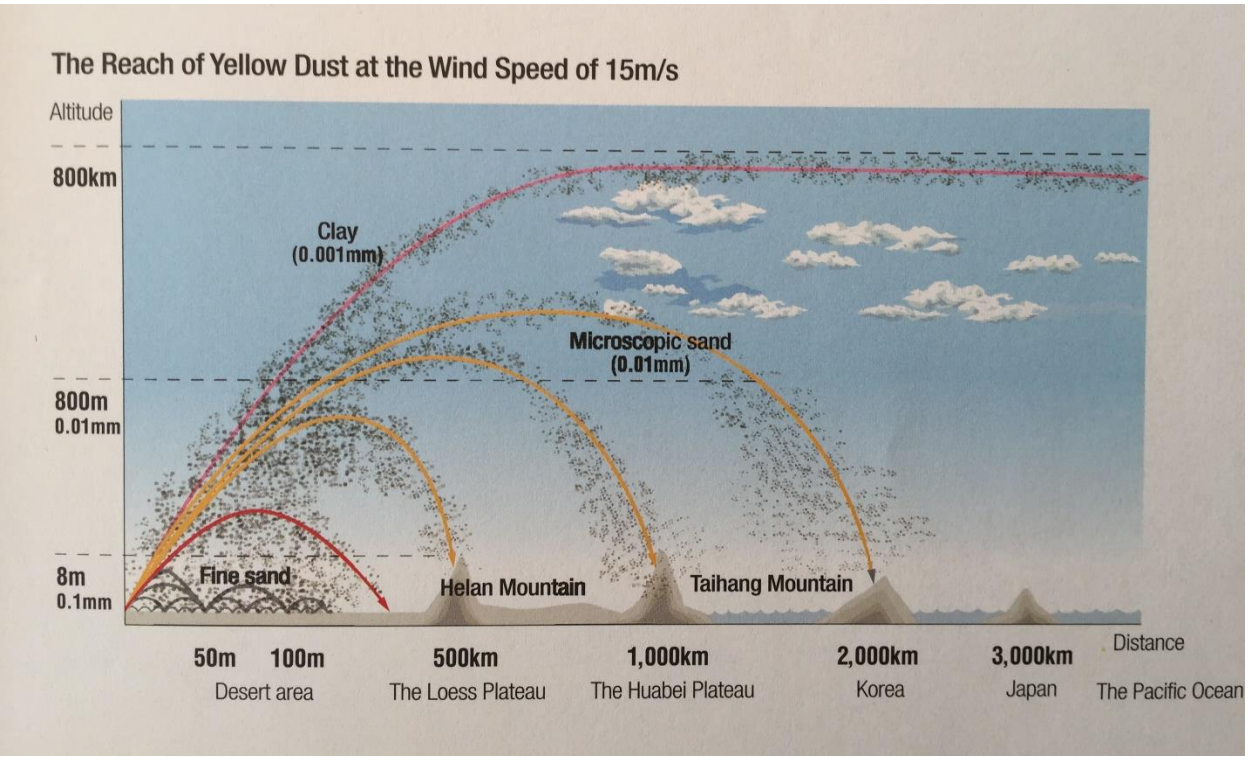

Figure 22: Particulate distance and relation in Asia

Mapping the wind in this way must not be understood simply as a redundancy with conventional political cartography, but rather a superimposition of one logic and materialization of space over another. Politics and weather entangle, but they are not versions of the same thing, even when there is a phantom repetition, as when Kwon narrates political and meteorological openings as a coincidence in time. What the Kwons' Future Forest and other anti-desertification organizations in Korea base their claim in is not the identity of political and environmental ties, but rather how the illustration of meteorological relations indeed creates new forms of relation and responsibility, by tracing the dust backward in time or by projecting its movement beyond.

The Friendship Forest

On the ground, the construction of a Chinese-Korean Friendship Forest depends on the continual goodwill of Chinese government sponsors on the ground and on the guarantee of continuing resources from the organization and its underwriters. For observers of Future Forest from other forestry NGOs in South Korea, it is the personal charisma of Ambassador Kwon, and his wide net of *guanxi* relation ties that were pivotal in the securing of the political support in China for the project. Personal political friendships, in the sense of a network of relationships that can be consistently mobilized, is thus the condition of the forest's ongoing existence, especially as its very existence could be understood as an accusation of Chinese environmental mismanagement for Korean *hwangsa* problems. For its part, Future Forest is at times administrative organization, planting force, fundraising machine, and a publicity machine with exceptionally high production value, using glossy publications, savvy social media, and corporate sponsorship to built its reputation as a leading international forestry NGO in Korea.

On planting trips, individual trees are tagged not only with numbers but with name cards that link them firmly with specific planters – as part of a planting trip, I left my business card with the name tags of the three people on my team. The organization also dedicates trees to important individuals, like Bill Clinton, who has endorsed the organization, tracking the tree's survival over time. Individual corporate sponsors, especially Korean airline and automobile companies that have been attracted to the CSR and publicity synergy of doing both anti-*hwangsa* work and using forestry to address their carbon footprints, have individual patches of forest that have been mapped in GIS. Indeed, the contestants for the Miss Korea competition were invited to the planting site in heels, further raising the profile of the Chinese planting as a Korean project.

However, the vast majority of trees are planted by local laborers, under the auspices of the All-China Communist Youth League, the organization that has been responsible for continually authorizing plantings. It is important that the program, which is relatively small in scale compared to the massive forestry projects of the Chinese state, is coordinated locally as a matter of youth exchange. When planting is not happening, the major tasks of Future Forest are fundraising and recruitment and training of a "Green Corps" of Chinese and Korean youth who are to be leaders in the promotion of Chinese-Korean ties through shared environmental and forestry work.

It is on the ground, in the planting sites that are so clearly re-territorialized as the dangerous upwinds of both Beijing and Seoul that 'friendship' in its clearest formation is to be realized. Planting trips that are mix of educational, networking, and publicity events take place each springtime, as groups trek out from Chinese and Korean cities into the source of the dusts. Multiple Seoul-based groups, including Ecopeace Asia and Future Forest frame their missions not only in terms of the technical and logistical work of planting windbreaks, but indeed building a human resources infrastructure of future environmental leaders with a pan-Asian sensibility cemented through cultural exchange. They run exchange activities between of Chinese and Korean university students handpicked to become leaders for a future Asia, who build relations through the shared work of planting in the desert, which is part of an itinerary of other group-building events like banquets with talent shows, and also group trips to a *jjimjilbang* Korean-style bathhouse that has opened near the Kubuqi Desert to accommodate Korean groups coming and going from the planting sites.

It is here, at the desert's edge upwind of both national capitals, that China and Korea are no longer arranged as respective source and destination, instigator and sufferer, of dust storms. At the places where dust storms originate, they are two downwind places, a day and another away, bracing for the same storm. From downwind Seoul, 'Asia' is best posed by heading into the source areas, where the wind arranges the two capitals both into 'afflicted areas.' Imagining this Asia from Korea depends on a form of vicarious spatialization, to think of China both as an upwind place, but also a site of shared vulnerability on the winds that darken two skies. In an Asia tracked to the flowing of the air, somewhere's upwind is always somewhere else's downwind. So this Asia can stretch in its movement, holding places together both in antagonism but also in common exposure. Tracing the routes of storms out then does both: it identifies problem areas to be re-engineered into a regional dust-break infrastructure, while also drawing places together as moments in the shadow of a floating continent. Tree-walls and friendship forests work on the earth while looking up at an Asia in the air, strung through in atmospheric connection.

When we unload out of buses, shovels and saplings in tow, we walk in single file along the soft spine of a dune, throwing sharp shadows into an earth that appears almost liquid. After

two days in transit from Beijing and Seoul, the group is ready to plant and play in the desert, chasing each other or taking jumping selfies in the kindling of new friendships. We work together in teams, laying down bundles of bound twigs and straw in a grid onto what appears to be virgin, freshly desertified sand. This is to create a sand barrier, within which we will plant poplar saplings. We put business cards on each tree so that, if they survive, they will stand as a symbol of cooperative work, Chinese, Korean, and even a Chinese American, working together for common protection from these too-airborne dunes. We sink our shovels into the sand to plant a new friendship forest, only to find, 6 inches below the smooth dune surface, the buried remains of last year's planting: a sand barrier identical to the one we are placing, perfectly preserved under fresh sand.

The Politics of Friendship

Certainly the dual status of China, in dust storm politics, as both the origin of storms and a necessary collaborator for their mitigation presents a challenge to formulating the friendship that such forests promise. Where Susan Buck-Morss, following Carl Schmitt, argues that it is the political identification of the enemy, through which a political collectivity comes into self-awareness, that is "the political act *par excellence*" (2001:9), the attempt of Korean groups to create regional cooperation aims for another kind of politics founded on an enigmatic notion of friendship. The principles on which multiple figurations of Asian friendship elaborate, however, do not fall squarely within what Derrida calls "the principle of fraternity" that undergirds an androcentric conception of politics-as-friendship (1994:viii), precisely because neither politics, history, nor meteorology default in the region to a relation between intimate equals. The challenge to friendship that the unequal status of China and Korea as source and destination of dust presents is exacerbated by historical suspicions that run deep, and current anxieties over the political and economic subsumption of tiny Korea by a China quickly rising to superpower status.

For Kwon and his counterparts, friendship is the affective condition and the relational format through which a regional politics must take shape. Additionally, creating the foundations of this friendship is a delicate task in an Asia marred by historical enmity and especially ongoing aversions, on both the part of Korea and China, to perceived incursions on national sovereignty. Difficulties mount when the origins of dust storms are consistently placed beyond Korea's airspace. When *hwangsa* is traced, by following arrows in reverse, to a looming, sandy China, a possible friendship between peoples and nations is populated, in the background by lingering blame and resentment, which organizations must at times explicitly address.

While Kwon's Future Forest emphasizes a perpetually optimistic vision of Chinese-Korean cooperation, the mood in Korean NGOs and the Korean public more broadly has been at best one of practical resignation to working with China to protect Korea while also arguing that Korea has regional responsibilities for their atmospheric footprint. "Asia" is the name of an scattered congeries of countries bound by geographic fate, as well as the necessary solution to resolving the problems borne of this environmental connection. Korea, and after another day, Japan, are in this sense, literally in China's shadow. Dust storms demand regional cooperation while also hindering it by redoubling fears of economic and political subsumption by China into threats of a meteorological subsumption to boot.

Meteorology's regionalism and nationalism are in friction, because a vectorial conception of Asia is both a singular space, united by storm paths, but also one differentiated by them. The

Korean NGO network takes for granted that dust storms sort 'Asia' into a heterogeneous space of sequential threats and exposures. From the lens of desertification and dust storms, China and South Korea are, respectively, an "inflicting country" and an "afflicted country," it also takes pains to argue that the rapid rise in South Korea's greenhouse gas emissions makes it also responsible for planetary air. Certainly the threat of dust storms and planetary global warming both invoke atmospheric powers, but they also present vastly different spatializations of impact: one is evental, directional, and relatively concrete; the other is general, un-placed, in the sense of a quantified contribution to a planetary airscape, and therefore abstract. However, this sense of Korean contribution to the planetary atmosphere has made tree-planting especially popular as a CSR initiative and massive Korean conglomerates like Hyundai Motors and Korean Air have sponsored anti-desertification initiatives in China as a counterweight to their own carbon footprints, and, as NGO workers at the planting sites speculate, as part of a preemptive PR blitz to drum up good feelings in China that will lead to increased market share.

The weather, then, like the economy, becomes both an opportunity for Korean regional leadership as well as a threat to national autonomy, swept as it is in regional flows of all different kinds. Nonetheless, 'friendship forests' rise across China, close to Chinese state-organized plantings, but funded and organized by Korean state and corporate organizations. They are, for Kwon, both proof of a friendship in the making and also the first premonitions of a friendship to come, a vision of Asian association that is staked not to past conflicts, but in anticipation of a coordinated response to the future airborne threat. The Asia that they elaborate is the zone of a shared fate and responsibility, carved out by the wind as an unlikely alternative to the historical enmities and ongoing conflicts that have defined and thwarted 'Asia.' The friendships that drive these plantings are anticipatory and pedagogical, posed as a challenge to see, through the potential re-assertion of nationalist jealousies, the enviro-ethical conditions through which cooperation might happen.

The Pacific Dust Express

all day staying inside
listening to a podcast
discuss how particles
over the Pacific
might drift
I knew thinking
whenever cloud
scares me
I am not alone
[…]
the emperor
everyone has forgotten
is speaking
no one knows
how to be
loving and also
hope the wind

in a certain
and not another
direction will blow

-from "Poem for Japan" by Matthew Zapruder, 2012

Beyond Korea and beyond Japan, the airstreams that skewer Asia carry the finest suspended particles west, as the wind blows. Over weeks, they make landfall in the United States, where they have been documented as far inland as the Great Lakes and even into the mid-Atlantic Ocean. In 2001, weeks after a string of great dust storms that intensified state attention to desertification in China, and which shut down schools in Korea, the *Denver Post* reported an enigmatic haze hanging over Colorado: a dust storm that "may have been dirt near someone's yurt in western China less than two weeks ago." Raining gently from the sky – or hanging there as a concentration – the dust was the "latest import from China" (Schraeder 2001). And the dust itself swept up pollutants in its path from China to America, in a hemispheric bridge visible from satellites. NASA, reporting on the same storm, called the dusts and all they carried evidence of a "'conveyor belt in the sky' that ferries air from Asia to North America in the spring" (NASA 2001): the Pacific Dust Express. If the breadth of America's oceans offered a comforting distance from that other world, underwriting the fantasy of a hemispheric insulation, the ribbons of rushing air that bring Asia here, too, assert a proximity in a Pacific region that has become a curtain of particulates.

Today, it appears that the material traces of an Asian century are everywhere in America, from wares that flood the marketplace to the particulates that settle in and out of the air. And while manufacturing moves east, America is again at the end of a conveyor belt, downwind of a slow disaster thousands of miles away, breathing its floating residues. The yawning sensation of America's connection and vulnerability to Asia by the surge of the Jetstream is an atmospheric disruption borne in the persistent transport of things by air, one-way from the east. What the dust carries is perhaps less important than what it stands for as a reminder of the porousness of airspaces; from firebombs strung to delicate paper balloons, *fu-go*, released into the Jetstream fall in the secure hearts of American territory during World War II to scanning and monitoring the air over Berkeley in the days after the 2011 nuclear catastrophe in Fukushima, in the air, America appears as an atmospheric aftermath of a windy Asia.

In California's Central Valley, researchers at UC Davis analyze the air samples collected by plane or at Chews Ridge, a mountaintop station air monitoring station in Los Padres National Forest. Determining the composition of the air, here, aims to determine its origins, because pursuant to the US Clean Air Act, localities cannot be held responsible for particulates from "foreign sources of pollution in ozone" (Ortiz 2015). Analysis of collected dust particles reveals that up to 10% of ozone in the Central Valley is foreign in origin, where scientists have established that geological profile of ambient dusts contain "crustal elements…of distinct Asian origin" (): Asia is literally in the air. Accounting, in California, for foreign air has become a touchy legal matter, insofar as the Clean Air Act identifies origin with responsibility. Substantiating these claims means substantiating the air (Choy 2010), by tracing and returning the composition of aerosolized particles to an earthbound ontology of origins and causes.

The legal practice of attributing air to places local or foreign based on linking suspended particulate composition to terrestrial places, makes the air a mobile proxy for the earth, allowing for the paradoxical situation in which California be both a massive atmospheric volume in

mixture, while at the same time, its air can be territorialized and delimited into distinct volumes, like spaces on a map. The comfort in such a subdivision of airs may be a response to the sense of danger in the existential penetrability of places to each other, a disorientation on a planet when over there is always and already over here.

But even as one can ask where someone else's air stops and our air begins, has it not already been acknowledged that airstreams draw and separate, create proximity and also difference for those gathered in its compositions? Follow the arrows, trace them back and forward, so that every place becomes a midpoint of the wind, between a somewhere and somewhere else. Nodes knotted in Aeolian relation with others, knots at the crossings of so many dust routes. As opposed to the planet-wide scope of climate change's atmosphere, where the global in global warming marks a ubiquity and therefore a no-place, the conveyor belt over the Pacific offers an architecture for an atmospheric politics fixated on and growing out of path-specific phenomena. This is an atmospheric politics that proceeds through specific trajectories rather than the abstract totality of the planet's air, and the ways that winds blow and draw places together layer into other geographies: in its paths, there emerge many knots and corridors in a planetary assemblage of local, mobile global, and climatic elements. For the world is wrapped and meshed in a singular air that everywhere actualizes in flows, streams, and stillnesses through which little atmospheres blow open. It is in the unity of the wind that differential exposures become evident.

In this Pacific Dust Express, flowing over and yet not quite overlapping with the economist's Pacific Rim or the strategic Pacific of 21st Century American military reorganization, there is perhaps the template of a planetary political collective to come, an archipelago of places in an atmospheric stream. Such a collective may pose long-standing political and ethical questions in new ways, fit for an age of planterarization alongside globalization. Californian air appears in part as an extension of Asian development, bearing the particulate signature and refuse of a China released through desertification or smokestacks high into the sky. In the Pacific as a tangle of winds and suspended things, places fall into an array of positions in an Aeolian network, upwind of some and downwind of others. Tree-walls and windbreaks grow and die, as the northern hemispheric appears more and more as a tangle of routes through which worlds and things mix in the sky and settle to absorb places in an atmospheric mosaic. What Asia, what friendship, what hemispheric relation will be possible, when "no one knows/how to be/loving and also/hope the wind/in a certain/and not another/direction will blow"?

Afterword: The Sound of the Wind

[…]
It goes on and on,
the ceaseless invention, incessant
constructions and deconstructions
of shadows over black grass,
while, overhead, poplars
rock and nod,
wrestle *No* and *Yes*, contend
moon, no moon.
To think of the sea
is to hear in the sound of trees
the sound of the sea's work,
the wave's labor to change
the shore, not for the shore's sake, nor the wave's
certainly not for me,
hundreds of miles from the sea,

[…]

But sea-sound differs from the sound of trees:
it owns a rhythm, almost
a meaning, but
no human story,
and so is like
the sound of trees,
tirelessly building
as wind builds, rising
as wind rises, steadily gathering
to nothing, quiet, and
the wind rising again.

The night grows
miscellaneous in the sound of trees.

[…]

-Li-Young Lee, from "Furious Versions: 6" (1990:25-26)

In so much of Inner Mongolia, where the sand is visible at the shore of the roadside or as a chromatic variation on the horizon, there are rows of trees to mark places of human settlement. They extend in feeble grids, kept alive by the dwindling groundwater or trucks that carry water from elsewhere, splashing on the earth with the sound of distant water. Walls of trees, poplars where they might survive and even where they do not, or magnanimously named 'forests' of *suosuo* whose shrubby roots and branches grasp the sand and fray the wind, are a bid to mark out

fixed points and landmarks in a place where the earth does not remain still. Where on the open of the grassland, a row of trees in the distance marked a settlement, a fixed point in the swaying oceans of grass, in the sands that such grasslands have collapsed into, trees and walls, grids and sprays of sticky petroleum, are not simply markers in space, but a bid to fix spaces in place. They are a work of engineering that aims to hold land against the wind, building, rising, steadily gathering to nothing. They are arranged in a geometry of points, lines, and polygons to literalize and re-establish an earth that might yet approximate the maps that each year less and less represent a changing territory.

Everywhere, the wind is visible in its imprints. These markers indicate a place in ongoing and inescapable existential with air in motion, begetting land in motion. Wind can be seen in its capacities to change a landscape and reorder a political spectrum, in its force in determining where trees will be planted, arranged in grids and at right angles to an anticipated airflow. Wind enters and suspends the logics, patterns, and hopes of a political apparatus suddenly exposed. The grassland, for years becoming farmland, is now again in transition. Reading the land is to read the abrasive flow of the air. When ears of summer corn have been harvested, it bends their naked stalks making them bow toward Beijing in the east. The wind sculpts trees into twisted shapes, *guaiyang*, strange poplars, whose contortionist forms chronicle its fluid micro-dynamics in its spiralings. The trees, this landscape, are what Theodor Schenk might call aerial forms, sculpted by the air as water shapes a landscape (1976[1965]:114-117). They part the wind while being shaped by it.

But it is not these things alone that are formed in their contact with the wind. In this dissertation, it might be that the ethnographic moments, the contortions and remakings of people's relations with their lands, the ways in which forestry organizations envision the reconstruction of the land into windbreak infrastructures – in their many forms, each is an aerial form shaped through the various powers of the wind as an existential, physical, mystical, political thing. These airs animate forestry bureaus into planting and maintaining trees as air-walls, moving rivers and pumping water from deep wells to keep them structurally sound. The wind's impress is in the red of people's windblasted cheeks, or in the bright scarves that people wear to cover their faces and remain visible in a dusty haze. It is visible in the undulations of a ceaselessly changing landscape or in the dust that has settled in boots, hair, lungs. It is the wind and the dust it moves that draw people to places defined increasingly by their unliveability, the source of a meteorological scourge that ravages more important places downwind. It brings forestry officials and Premiers of the Chinese Communist Party, it makes herders and farmers into foresters, it makes anthropologists into cartographers of Aeolian relation and into amateur Aeolian physicists. When the atmosphere has become startling solid, it is the wind that reminds of connection to landlocked places, far from any ocean, an earth that dissolve into sand and then lift into sky.

The wind haunts, too, with the premonition of other places, linked and moved by its flow. Far from water, the sound of wind parted in trees in the blackness of an Inner Mongolian night creates a sonic enclosure like the rain that never comes enough here. With eyes closed, wind rushing through poplar branches conjures the vision of waves breaking on a shore most people here have never seen except on television. This sound is a sonic envelopment and a mimicry of other places and other times, the wet season, places with wet seasons to counterbalance dusty springtimes. Absent water, everywhere heard in the rush of wind through the branches and leaves of winbreaks, is a sound of Inner Mongolia.

The relentless of a geophysical process and of the wind as a transformer haunts. What is meaning here, or better, what is consequence without agency? For the wind does – it acts, if action is disentangled from intent and its anthropocentric cognates. Li-Young Lee, poet, immigrant, refugee, American, hears the sound of waves and trees; it works without intent, for nothing's sake. They exist, certainly, but not *for* anything. Rather its doing is a layering and pulsing in time. It is, in Lee's terms, a rhythm that tempts with meaning while thwarting it – 'almost.' The ways in which sounds reverberate and mimic one another, as trees against the windy desert resound like the ocean, they indicate more a profusion of states. In the sandy places that this dissertation takes us, the wind makes sandy lands heave like mineral oceans, it makes dunes roll as dry waves. A rhythm sculpted into an undulating earth. If this is almost meaning, Lee muses, it is not a human one, if meaning is a special perquisite of human being. We cannot know for sure. And if it tells a story, then the story cannot be human, though it can beget story, compel a telling.

"I'll tell my human/tale, tell it against/the current of that vaster, that/inhuman telling" (Lee 1990:27). For Lee, earth, wind, and sound drive an impulse to tell. If Lee propounds human narrative in the near-meaning and non-meaning in the wind and its imprints, it is reactive rather than active, a re-assertion of his humanity in the telling of a story, in the face of an engulfment by the extrahuman presence echoing in the wind-sound. This humanity, it seems, cannot be taken for granted – it is an assertion, given always in reaction to a power in the world. It is to suggest that human narrative nonetheless finds its authorship elsewhere, in an impossible relationship with those inhuman tellings.

Where the wind and the trees, the sands and the sounds, tell no human story, what can ethnography be, and what can an anthropology shaped by these inhuman tellings do? Following and departing from Lee, I suggest it is an attempt at narrative that catalogs a suspension, a being-unsettled by a medium like the wind fritters a sand dune into a plume. As things suspended settle again, this suspension is not simply a becoming-aeolian, but also a gesture toward thinking of writing suspension as an attention to rearrangements, what Deleuze calls, focusing on the earth rather than its embroilment with the atmosphere, a dynamics of de- and re-territorialization. This dissertation is a bid at a narrativity that does not aim to discern, let alone triumphantly declare, a human telling out of an inhuman one, but rather, aims to consider how this "vaster, inhuman telling" might fold and fold into emergent topologies of power, landscape, time. It configures a problem-space for anthropological inquiry as a field of consequential elements, human life and political agency among them

Suspense

What holds the moments of this dissertation together is their differential exposure to the same winds. In the ecological construction programs for combating desertification and protecting downwind skies, the wind has not become only an enigmatic object and agent with which state institutions must contend. Indeed, its properties, flows, and powers shape the emergent spaces and modes of relation through which a political meteorogical infrastructure has staked its concerns and goals, while also offering a site for the proliferation of atmospheric and environmental logics and techniques in governing.

While we might attend to the consequentialities of the wind and air to see a field of elements and objects as air forms, it might be more important to note how atmospheres create the conditions for new modes and mediums of relation amongst disparate elements. Sands, roots,

cities, bodies, forestry agencies, and market schemes, real estate development and 'voluntary' relocation must be understood as a congeries of things held in relation to the powers of the wind. It is not then simply that airspaces raise new problems for architecture, but more profoundly that the atmosphere as a dynamic and mobile medium creates an architecture of contacts across space and that cuts across the conventional borders that divide administrative sovereignties or the purified boundaries between human, nonhuman, animate, and consequentially inanimate. In the wind, all these things swirl together and settle out in the unending composition, re-composition, and decomposition of an atmospheric admixture: a vast suspension.

Tim Choy and I have considered the properties of suspension (2015) as both a way of understanding the relations between atmo-ethnographic things – wherein things exposed to the wind become particulates among others – and as a way of considering an anthropology in suspension. To cultivate an atmospheric sensibility, this means we must be ready to allow anthropology to drift and fray and then to shift and resettle into new forms, but also to understand the

This dissertation has been an ethnography of politics and suspended and suspensible particles, how they enter into and shape politics. The *ethnos* at hand, where it appears, indicates an embroilment and the capacities and vulnerabilities through which human being is threaded into and through its surrounds. The subject is not self-sovereign, but atmospheric – it appears, politically and existentially, through its relations, its vulnerabilities, and its susceptibility and accessibility to the environmental mediums and mixtures in which it is situated. The dissertation's goal was to track what politics might look like set in and poised against the consequential processes by which pastures that become dunes, and dunes that become dust storms, how winds and sand become topological transformers that make the line between earth and sky an interface of states of matter rather than a boundary between terrestrial and atmospheric worlds. We aim to think with materials and processes – sands, winds, rootings - that come to oscillate between suspension and settling in a succession fluid and momentarily stable forms. They comprise the conditions of an unsettled politics attuned to environments that undergo phase shift, as winds and sands behave as solids, fluids, abgnd suspensions. I suggest that at stake is a politics and an anthropology that is forced into new forms, just as the relentless wind twists the wood of a tree into its fluid imprint, or makes a desert ripple like an ocean of potential particulates in a virtual cloud coursing eastward.

This dissertation is a catalog of these twistings, and it tries also to be an example of one. It sticks close to wind and sand and lets itself be moved by them. It tracks how wind and sand, coalescing into blown sand, unsettle politics into novel suspensions, out of which new permutations are possible. The language of suspension and settlement I mean quite literally, referencing suspension both as the name of a specific dynamic of mixing materials and the process by which they fall in and out of suspension. Suspension makes desertification a problem of dust clouds as the wind reveals itself as a medium for landscapes revealed as suspend-able. Suspension makes Inner Mongolian sands an Aeolian concern, where desertified places become points in the metropolitan airshed of downwind cities. Remember, suspensions are not simply mixtures of entrained solids in a fluid medium, but also the name for the process in which they become mixed: materials are agitated into motion and relation with a medium, they hang, perhaps for a long time, before materials settle out, falling into new relations and patterns. Suspension gestures at a process that is certainly effective, but is not 'lively,' to be explained through genealogy or analogy to biology, vitalism, life. It is a power of things to sweep and be swept away, to agitate and be agitated, to release and settle: in suspension, I am dilute, mixed in

fellowship by proximity or shared intermittent medium with many others in an atmospheric fold (Choy & Zee 2015).

I have tried something different from asking into a politics *of* environment, as if environment were a specialized province, a region of interest, in an otherwise unreconstructed continent of the political, or as if the politics 'of' any object were already clear, pre-narrated because already narrated through some overarching critical or theoretical frame. This means that my goal has not been to evaluate the rightness or effectiveness of Chinese state environmental politics, but rather to ask how various environmental things and configurations work to drive experiments in the what and how of politics in China. It instead attends aims to find a way to discuss contemporary forms of power that also attend to the powers of "forms that cannot be imagined (even ideally) as persons" (Bennett 2010:xii), like sand, dust, wind, branches and roots, strange weather. The inquiry concerns dust storms, desertification, wind, and sand – not how they become political, as if absorbed into a rapacious and always increasing power, but rather, how they press into politics, how windy and sandy materials and forces unsettle the conditions of an anthropocentric politics, a view of politics as between-people. The political apparatuses that this dissertation describes shift to capture and govern these materials, but in a sense, they are captured and governed by them, as well. Power itself, logics of governing, what counts as political in the wind, may find itself swirled into new topologies (Collier 2009) fixed on fixing sand, as amenable to its agitation and settlement as the materials, human and otherwise, that it seeks to govern.

What political apparatuses and constellations of governmental techniques and logics might assemble through the encounter of existing Chinese political institutions and logics in this fourth decade of Reform and Opening and various figurations and substantiations of the environment? The first major modern anti-desertification at a national scale, a tree-wall, the Three Norths Shelterbelt, or 'Great Green Wall of China,' began its 'construction' in 1978, the year of the official commencement of Reform and Opening, the experiments in sovereignty and economy that have to date, as the Chinese state reminds, lifted hundreds of millions out of poverty. In a land of many superlatives, the Three Norths Shelterbelt, proceeding in ten-year stages and to be 'completed' by 2050, is and will be the largest ecological engineering project in human history. China's participation in the UN Conference on Desertification in Nairobi took place a year earlier, suggesting that a story of Reform China can be told through its fight against sand and dust and the many small endings that it portends. Dust in the wind, and the ways in which it sparked political forms grasping to make themselves proper to its challenge, can offer us not simply a glimpse at all that excess and detritus which exceeds a simple narration of China, or any place, as a story of emergence or coming collapse. It is the task of this dissertation not to identify an excess, but to note how attempts at its subsumption through a transforming and transformative topology of power condition a politics in formation, shaped by the winds and sands whose powers they aim to control.

In the great infrastructures that rise against the sand and are slowly engulfed by their motions, an environmental time-space for politics opens, one that invokes a political logic whose aim, for now, is endurance and the extension of the present rather than a grand realization of the future. The future is not an overcoming of the present, but in sand, a holding steady. For a state presented with a multitude of shifting and chaotic things, infrastructuralization of land and society are bids against a chaos that is always just over the horizon, rumbling in the human and geophysical materials at hand.

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