HOLDING PATTERNS

Sand and Political Time at China’s Desert Shores

Jerry C. Zee
University of California, Santa Cruz

Ocean, don’t be afraid.

The end of the road is so far ahead

it is already behind us.

* “Someday I’ll Love Ocean Vuong” (2015, lines 1-3) by Ocean Vuong

Li Ming, the ecologist, and forestry official Tian[[1]](#endnote-1) are standing with me in the footprint of Qingtu Lake. Once the anchor of a verdant oasis of reedy wetlands in Gansu Province’s Minqin County, today, the lake is an expanse of sand that extends past the horizon. As late as the 1950s, Qingtu Lake sprawled luxuriantly over 400 square kilometers, 60 meters deep at its lowest point. In the span of decades, with groundwater drained in the utopian social-agricultural experiments of high Maoist socialism, the lake disappeared completely, leaving a carpet of mobile, alkaline sand. It swirls around our heels like water lapping on a still-remembered shore. It pools around our boots. On the spring day that Li, Tian, and I have come, we walk across the lakebed, wading shoulder-deep in absent water.

Minqin County is dotted with places like the lake, where the relentless pace of desertification has disjoined toponyms from the landscapes they named just decades before[[2]](#endnote-2). Minqin, once an oasis *en route* to the eastern terminus of the Silk Road, is wedged at the sandy nexus of three provinces: Gansu, Inner Mongolia, and Ningxia. It is today an archipelago of places scattered like islands in what many of the state foresters that I speak to call the *shahai*, the sea of sand. The oceanic turn of phrase, ‘sand-sea,’ is a metaphor that spotlights the possible meanings for sand and desert in Minqin. It draws attention not only to the sheer size of new and active desert-lands, but also to their oceanic activity. Loosed on the wind, desert sands gather into dunes that flow like a slow liquid, land swallowing land.

In this *sand-sea*, Minqins exist in the grim anticipatory state of the not-yet-buried. As two deserts run aground over the oasis, scientists scramble to devise methods for modeling dune drift in the region (Sun et al. 2005), generating scenarios that project Minqin’s ultimate burial over coming decades. For China’s State Forestry Administration, the disappeared Qingtu Lake has become a powerful cautionary site in the central government’s fight against desertification. Sand control campaigns across China’s desertification hot zones have become anxious stagings in the state’s combat against mobile sands that now drift over a quarter of China’s landmass and periodically rise into its skies as dust storms (Liu & Diamond 2005).

Today, exposed lakebed sands make the air a translucent haze that stings our eyes and scratches our throats. For forestry official Tian, the lake is Minqin itself. From our vista point on the lakebed, Tian, who is in his fifties, recounts the waterfowl which have long stopped coming. He remembers taking his children swimming here. “The lake contracted, slowly and then quickly,” he remembers. “Where it dried, the sand on its bed was free to move everywhere. With no water the farms went dry. Even if they did not become sand, it was impossible to keep sand from burying the fields.” In his telling, sand has become a mineral spur to remembering. It “holds geological memories in its elemental structure, and calls forth referential memories” (Agard-Jones 2012, 326), and in its texture, color, and dryness on the skin, exposed sand opens a catalog of environmental changes and disappearances.

Sand renders time into recursions. Remembering through sand is also in this way a foretelling. As a material that moves, accretes, holds momentarily steady, or tends to dissolution, it draws together past and future burials each as “an exception, shall we say, that announces itself only as an example” (Song 2012, 131). It not only provides an occasion for memory, but gives form to a way of thinking time in Minqin. Past burial events appear as an earthly momentum; sand’s materiality is cautionary. “In ten years, twenty years, or five years, the sands will swallow Minqin, too,” he says, pushing his hands together to mimic the press of the two deserts that flank the sandlocked county. This pressing is a foretelling of Minqin’s future from the perspective of a past ending, each of which becomes an example of sand’s powers to bury. Sand, for the forestry official, offers a medium through which pasts and presents come to form. Its past and future motions link memory and prognostication as the repetitive realization of a process already imminent in the geodynamics of the unrestrainable desert. As lakebed sand slips through my fingers to trace out the direction of the breeze, Li Ming, my ecologist friend, explains, “In places like this, we are no longer confronted with the problem of development (*fazhan*), but rather the question of existence (*cunzai*).”

In this paper, I follow Tian, Li Ming, and their colleagues, to learn to tell time through sand. In the various ways that sand itself shapes state landscape engineering, sand operates as what Stefan Helmreich calls a “theory machine” (2011) at the interface of material processes, environmental change, and the chronological conditions and tactics of political intervention. Telling time through sand’s properties is a way of giving form for a “near future” (Guyer 2007, 410) that forces environmental engineers and anthropologists to grapple with near futures poised between the immediacy of omnipresent crisis (Massumi 2009) and long-term environmental collapse. I ask how sand control programs in practice make the governmental control of and intervention into time a site of chronopolitical experiment, where the soaring futures of the state are reshaped through sand as a material that variously accretes, buries, oscillates between motion and stability, or provides a habitat for geo-engineering plants.

The Anthropocene question and contemporary environmental challenges demand ways of imagining the future in the obliteration of a cleavage between human and environmental history (Chakrabarty 2009). Whereas in many contemporary Anthropocene imaginaries, ‘environment’ increasingly scripts an earthly future speeding toward disaster, in this paper, I begin by noticing that earthly processes are increasingly reframed as a way of planetary fortune-telling. For instance, in tracing out contemporary environmental processes as the engine of a coming cataclysm, the dynamics of anthropogenic earth systems also become the template for a temporal form that arcs toward disaster. In what Nancy Oreskes and Erik Conway, in their sci-fi history of the future, call the Great Collapse the inevitable climatic-political resolution of today’s Great Acceleration (2014) climate projections are also narrative forms. In an increasing alignment of environmental processes with doomsday, ‘environment,’ today, is increasingly the name of a powerful process that vibrates with the sense of an ending. But for sand control engineers and ecologists, sand discloses futures that may also challenge the singular narratives of environmental ending, while in the meantime earthly and political rhythms to demand new vocabularies for futures that end, but may also cycle, endure, and recur again.

Sand’s multiple temporalities rework the chronopolitical stakes of environmental governance in various technical, personal, and scientific sites across desertifying China, while also signaling an expansive repertoire of intra-actions of environmental and political tine. By chronopolitics, I mean the various ways in which the political does not merely operate in “empty, homogenous time” (Benjamin 1967: 261), but rather, tacitly and sometimes explicitly makes the manipulation, acceleration, or projection of time both the condition and ongoing goal of political and governmental intervention. Through ethnographic research in the scientific, political, and engineering apparatus that aims to control desertification in China, I explore how state anti-desertification programs confront sand and align political interventions with temporal formations that route politics through the dynamics of material, environmental, and ecological processes. A chronopolitics of earthly endurance, forestalled burial, and the kickstarting of ecological cycles begin from the encounter with sand’s various temporalities. Engaging with sand as a substrate of offers a method for thinking beyond the rendering, in some narratives of Anthropocene futures, of a geological stage hemming the future into a singular trajectory.

Mobile dunes, blowing sands, and desertification, I suggest are sites where we can trace emergent alignments of politics to the inorganic afterlives of the broken land. Recent work in anthropology (Kawa 2016; Moore 2016; Whitington 2016), including reflections on “an Anthropocene Yet Unseen” (Howe & Pandian 2015) have aimed to generate a vocabulary for our environmental contemporary and its possible futures. Here, I ask how a politechnics (Anand 2012) of sand control might also generate an archive of resources to stoke speculative futures that fully attend to practical encounters of politics, knowledge, and materials.

Instead of rendering environmental futures through epochal claims and planetary stages, I ask how, in practice, specific environmental processes and materials can provide a repertoire for chronopolitical experiments. As Ann Anagnost has argued, modern Chinese politics must be tracked through “tactical plays on time” (1997, 7) where state practice did not merely have temporal dimensions, but was indeed explicitly conceived and practiced as action on time, a catching-up to History. In combating sand, state scientists and engineers do not simply articulate environmental futures that are more textured than ecological doomsday narratives and their own perplexing universality. They also organize programs of state landscape engineering whose temporal horizons and chronopolitical techniques rework the futurism of the Chinese Communist Party’s political imaginary. I consider how, in the process of attempting to address specific environmental materialities, anti-desertification programs in China enact sand as a substrate for a variegated repertoire of temporal forms and the experimental political forms that attempt to control them - some, but not all of which render contemporary environment through the figure of coming collapse[[3]](#endnote-3). How does sand, rapt in multiple earthy, geomechanical processes, displace the open, linear futures of political time into other chronopolitical forms? If sand encroaches into space, how too can it encroach on time?

**HOLDING PATTERNS**

Anthropological thinkers have long had an interest in the nature of time in different social orders. Reflections on statist time in recent anthropology trace specific modes of temporal experience as the ongoing conditions and achievements of political practices, running the gamut from “etatized” temporalities of waiting and boredom (Verdery 1996, 40; O’Neill 2014) to the repetitive cycles of failure and deferral in technocratic programs of governance (Ferguson 1994). Such writing extends much longer anthropological insights in the mutual interaction of political, environmental, and ritual formations of lived time (Evans-Pritchard 1940; Munn 1992; Leach 1961). Whereas earlier works in ecological anthropological focused on the self-regulation of human-environmental systems (Rappaport 1968), in contemporary environmental anthropology organize modes of anticipation that complicate notions of timeless nature, from the idioms of endangerment and extinction that condition anticipatory nostalgia (Choy 2011; West 2006, 1-4) to the various modes of natural history that firmly situate nature in time (Raffles 2002; White 1995). Together, these varied works signal an orientation toward specific modes of experience in time - historical, political, ‘natural’ - emerging through potent nexuses, not all of which can be attributed to the work of human agents.

Exploring how, in the encounters that drive state environmental construction in China, engineers and scientists reorient their temporal horizons through forms of geophysical and ecological future-telling demands that they grapple with environmental processes, grasped through scientific and practical training but not reducible to these ways of knowing. Geophysical and ecological temporalities traced through sand complicate the state-generated and personal futures that have long been a mainstay in Chinese politics. The future-orientation of modern Chinese politics, and, more broadly, a contemporary investment in speculative, anticipatory things (Adams, Murphy, and Clarke 2009) have long made the future a tactical achievement of governing. Lisa Rofel writes that the “repeatedly deferred enactment marked by discrepant desires that continually replace one another” (1999, 9-10) has closely tied together state programs of modernization with continually frustrated anticipation in time. In Reform China, ethnographers chart a proliferation of political and personal futures in the loosening of state monopoly on future-making (Buck-Morss 2000) in the new possibilities of consumer and desirous futures in the Chinese amalgam of authoritarian control and market experiment (Ong and Zhang 2008; Rofel 2007).

“Traces of the future” orient the present as “a placeholder for things to come” (Braester 2016, 17), a transitive moment in the realization of utopian promises. In the People’s Republic of China, there has been a succession of official futures, from Mao’s worker’s paradise to the new promises of consumer paradise (Zhang 2010) in the vertiginous promises of infinite economic development. While for the state theorists, the ecological problem suggests passage into the next historical, “ecological” stage of Chinese socialism, desertification politics takes shape as a site for the proliferation of environmental-material temporalities that undercut any sense of statist politics unfurling in a singular form. A keen sensitivity to environmental processes reshapes the chronopolitical stakes as political and material accounts of the future pattern into one another.

Scientific and engineering engagements with an environmental material as commonplace as sand can work as a test case for forms of political time under the apparent encroachment of environmental forces. Sand is not only one thing (Mol 2003). The various technoscientific and engineering agencies that seek to control it attune to its multiple properties (Shapiro 2015) to develop an arsenal of chronopolitical interventions. As it flows in dry waves or sustains successive plant seres, it appears rather as a material in and at the cusps of multiple processes and at the center of political and technoscientific experiments.

In projects of geophysical stabilization, sand’s times confront the unity of the promissory futures of the Chinese state’s program of modernization and historical emergence with a future populated by processes that can be traced through and projected out of the Chinese earth. To think with Reinhart Koselleck, “[w]hat follows will therefore seek to speak, not of one historical time, but rather of many forms of time superimposed one upon the other” (2004, 2), with a particular attention to how forms in the mobile sand pattern into the temporal grounds and horizons of state action. For state bureaucrats, ecologists, and sand control engineers, the earth appears as a mobile quantity, the material substrate of many futures in a tangle of engineering techniques, ecological interventions, and anxious hopes for topographical control and the revivification of a sand-choked future.[[4]](#endnote-4).

To attend to sand, for the scientists, bureaucrats, and engineers, is less to tell a history than it is to frame a metahistory. ‘Metahistory’ is a term I borrow, of course, from Hayden White (1973) to investigate forms of emplotment in historiographic writing. Metahistoric genres and forms generate narrative expectations and futures in a story; these forms are out of time, but they structure time, including the chronotopes of ethnographic writing (Fabian 1983). As David Scott argues, specific generic forms hold any particular political present in relation to “the salience of the horizon in relation to which it is constructed” (2004, 19). Whereas White and Scott explore metahistoric genres as powerful literary conventions, for scientists and engineers contending with sand’s slippery mobilities, material processes organize their own countervailing modes of time with which state programs must grapple.

In an extension of their literary method, sands, deserts, and dunes can be productively explored as *forms* in Eduardo Kohn’s sense. These forms undergird ways of emplotting futures in consequential ways, not limited to the literary and generic conventions that structure historiographic narratives. Form, writes Kohn, manifests in “self-reinforcing pattern[s]” (2013, 180), that propagate across domains. In this propagation, politics temporalities are “mediated and mutated by a form that is not exactly reducible to human events or landscapes” (183), even as they shape them. Sand substantiates various temporal forms powerfully interact with given political temporalities.

**WAITING FOR THE HORIZON**

From a pavilion atop the reservoir that feeds Minqin County, the county’s main town is visible as an island between two deserts. Lodged between two deserts, Minqin is acutely vulnerable to engulfment by sand pressing against the main town on both sides. The central declaration of the county as a key zone in the nation’s fight against deserts has drawn resources in the billions of *renminbi*, expertise, and political attention to this unlikely place, already 95% covered in sand. This vista is the first that a visitor to Minqin gets as she emerges from the sheltering colonnade of windbreaks that protects the only road into the county. In the absence of local surface water, this reservoir holds and drains the diverted Shiyang River. Its waters feed the anti-sand forestry programs that have sprung up around the town like medieval fortifications, a moat between city and sand.

Keeping Minqin unburied is a key symbolic achievement of the state’s campaign against sand. The continuing existence of the city is a key policy goal of high-importance central government programs like Project 937, which has supported sand engineering to hold the deserts at bay while implementing state-supported depopulation of the oasis. As sand threatens the very possibility of ongoing habitation, Minqin has become an exemplary landscape. Minqin’s predicament thus contains and doubles a China that is splintered into places that can be plotted in various stages of burial, affixed to stages in the timelines of sand. Minqin is widely posed as a political and technical proxy of the active deserts that loom just 100 km outside of Beijing’s city limits.

<IMAGE 1 HERE>

In central government parlance, the movement of the sands is a ‘swallowing,’ and Minqin sits at the ‘throat’ of deserts. It is a place that can only be said to still exist. Everywhere, the city’s predicament is posed in relation to the fearful future moment when the two deserts touch, rendering the city uninhabitable. The looming future ending drives changes in the social and physical landscape of the region. It has spurred a general reorganization of government in this ex-oasis through the politics of sand control. The massive investments in controlling the desert are conditioned by and elaborate this sense of an ending that is always, literally, on the horizon.

Minqin’s slogan, visible for teams of visiting cadres and forestry workers, for instance, narrates political investment and urgency in reference to a future that must be averted at all costs. Penned in the calligraphic hand of geologist turned premier of the CCP, Wen Jiabao, the slogan demands that “Minqin must not be allowed to become a second Lop Nur.” The first Lop Nur to which the slogan refers was, like the lakes that once sprawled over Minqin’s oasis, for centuries a massive inland sea in the neighboring Xinjiang region. In 1973, it was declared officially dry, leaving a massive alkaline footprint which has become a major dust storm source in western China.

Wen’s Minqin is already located as a point on the timeline of its own disappearance, one that approaches the city in the backward shadow of its coming negation. The slogan enacts a call to a politics that approaches the future as an event to be held at bay. It does so by linking Minqin’s future to a past disappearance, and both to the development of deserts in general.

Here, political action addresses a future that hurtles closer by its own progression. A politics against the desert takes, in Minqin, the structure of a negative command. The triumphalism in state narratives of infinite progress is reshaped through the ongoing work of holding sand against its powerful tendency to spread. Such a politics in sand no longer addresses itself to a utopian future but merely to the aversion of an ending already in process. Nor is there a sense that the state can do anything better than holding the desert at bay in a tentative stalemate that may at any moment tear open. Wen aligns political intervention with preventing an event that has already happened and, left to itself, is on the brink of happening again.

I have come to Minqin, this time, with a group of forestry officials making their pilgrimage to what has become a Mecca in the world of Chinese anti-desertification politics. They are a group of technical, scientific, and bureaucratic officials who have been charged with holding the desert at bay. Some, like Tian, are local forestry cadres who are invested in saving their hometown. Others, like Li Ming, my ecologist friend, have from other places in the institutional geography of state sand control, including officials from Beijing. We leave the promontory at the reservoir’s edge and embark on an inspection tour that will take us past half-buried barricades at sand’s edge and into the desert, where sand-breaking grids built of straw, nylon sandbags, or green plastic netting designed to function and look like sand-holding vegetation undulate with the ebb and flow of the dunescape.

For the foresters, the landscape is a monument to its own movements and changes in time. Different places become exemplars of stages in the life-history of desertification. The series of sites string together as moments spread in a tableau over the county’s sand drifts. Its progress can be read through the evacuated villages and buried fields that extend far past sand’s edge. It is in the rutted out trails that balloon off paved roads, where sand has encroached in smooth pools that trace the shape of the wind. Buried and toppled sand control infrastructures mark the power of the desert to continue.

To them, the land is movement; it is a speed. Speed here is not quickness, but rather, a relation between time and distance. It does not stop, it only rests. The land’s motion and stability do not appear as opposites, but rather as two possible expressions of this time-space of sand. Sand, rendered as material velocity, incites a reflection on speed in counterpoint to the “[c]ontraction in time, the disappearance of territorial space” (2006[1977], 156) that Paul Virilio identifies with modern technologies. At the reservoir’s ridge, engineer Liao speaks to the group, framed by the stunning backdrop of a town pressed on both sides by walls of sand. “The sand moves an average of 10 meters per year from each side, sometimes reaching 20 meters,” he estimates. He presses his hands together to simulate the two deserts. “When the two deserts hold hands,” he says, “not only will Minqin disappear, but this whole region will have changed, in just decades, from a lush oasis to an unbroken plain of sand.” Where geological epochs arrange vertically in stratigraphic layers, Liao marks and projects the passage of time moving horizontally as an advancing contour on the earth’s surface.

Forestry and sand-holding programs appear as techniques for intervening in this rate by modulating sand’s speed. The literary scholar Rob Nixon suggests that environmental processes like desertification fail to become properly political because such ‘slow violences’ fail to breach the threshold of attention for a politics oriented toward spectacular events (2011). Speed, Nixon suggests, is a condition of politics as such, and more importantly, it is a temporal disjuncture between the slowness of environmental catastrophe and the short attention spans of contemporary politics. Liao and the foresters, invited to imagine Minqin’s future as a process of inexorable burial, articulates the desert’s speed as one that is both fast and slow. When *terra firma* can shift into a mobile substance (Choy & Zee 2015) any movement is too fast; and yet, because Minqin’s burial may yet take decades, the problem of desertification is one that remains forever in a future that is at once both too close and too far.

Such a process and politics elude the binary of fast politics and slow environment implied by “slow violence,” with its simple mismatch of environmental and political speeds. Indeed, for a Minqin whose end is both immanent and yet still always in the future, forestry engineers find the county caught in a period of waiting, wherein the end is always present and yet still not immediate. Joe Masco explores the depiction of nuclear holocaust in early Cold War America to argue that “national contemplation of ruins” “created a new citizen-state relationship mediated by nuclear fear” (2008, 361-362). Constant depiction of future ruins was a technique for the conditioning of an unsettled everyday affect, a sense of living emergency. In Minqin, out of the many ways in which political practice and lived time are oriented toward a coming disaster that is both too fast and too slow, the present has become an intermediary period. While for Masco, the urgency of nuclear threat animates a sort of frenzy, one that persists in contemporary American anti-terror campaigns, in Minqin, it is a different kind of urgency: that of waiting. This waiting must be prolonged. For the forestry officials, Minqin only still exists. Preventing Minqin from becoming a second Lop Nur or a cautionary vision of a future Beijing, means that sand control efforts locate the present in the fearful anticipation of desert encroachment. They are looking for a holding pattern, forestalling the future by engineering the landscape into a stasis carved against the progression of sand.

The remaking of Minqin’s social and physical landscape is a means of therefore engineering space to engineer time. Sand control infrastructures that stall the flow of the land are part of a more general calculative logic that aims not to obliterate the desert as such, but, for now, to stall it in a holding pattern actively poised against sand’s futures. A slowed landscape equals a future deferred. Minqin has become a showcase for the anti-desertification engineering techniques that, under the implementation of the forestry bureau, have sought to protect the city by a set of practices of *zhisha*, sand control, or more colloquially, *yasha*, pressing sand. Around Minqin, there is an engineered landscape at and beyond the sand’s edge, 330 km of barriers positioned to cut sharp edges back into a dry liquid landscape. Further in, there are rolling dunes engineered into tentative stability, part of a spectacular infrastructuralized landscape where the encounter between sand and state is staged.

At *Laohukou*, where the Tiger’s Mouth mountain pass funnels air currents into sand-blasting jet streams, Liao, a veteran sand engineer, wends his truck off the road into the curves between dunes, where we see construction in progress. Trucks pile high with bales of straw, collected after the corn harvest in other parts of the region. A corps of men, mostly ex-farmers who now work the dunes that have buried their fields, dig the straw stalks into the ground, tracing out an undulating grid of low windbreaks. These grids are one of a number of techniques that environmental engineers employ to slow sand drift by breaking the wind at the dune’s surface. These and other techniques recall historical landscape engineering techniques in China, for instance in the management of the nearby Yellow River (Zhang 2016). Here, they are used across the landscape rather than in a tight line that hugs the edges of infrastructures. Such physical barriers are replicated in a number of materials, from other kinds of farm waste to burlap or nylon fashioned into sandbags or low walls. ‘Biological methods’ like tree-planting or aerial seeding are prohibitive this far into the desert for the low water content and general shiftiness of the soil substrate, and in emergency situations, chemical methods, mostly involving the spraying of petrochemicals directly onto sand, laminates loose sand into a self-adhesive sheet. They turn the dunes into a rolling barrier against themselves, and as time goes on sand forms into slopes on the inside edges of the squares rather than moving across the land.

Forestry engineer Xu, who works for Minqin’s county forestry bureau, coordinates the logistics of rounding up materials and labor for construction. He laments the ephemerality of all of the infrastructure that today proudly announces itself with a slogan written in cornstalks: *Fix Sand and Block Wind! Protect our Home!* “Grass is organic,” he explains, “and so it rots and it is subject to erosion. If it is an especially dry few years, the squares may last for four years, but they may disappear as quickly as two.” Nylon is more durable, but more expensive. And even if the grass or nylon squares can outlast the process of their own decay, he explains, it is likely that they will be buried before that time comes.

Xu’s job is also the coordination of new construction and planting, which moves one step ahead of the sand’s leading edge to slow the flood. “We will be doing this for years,” he confides, looking over the organic and abiotic sandbreaks that have made the landscape an unnatural infrastructure (Carse 2012). Construction implies the work of an ongoing repair and maintenance, and then rebuilding over the buried ruins of earlier projects. The work is labor intensive, and sand control has become a major driver of the economy, ‘catching’ those no longer able to work their fields. Closer to the city, the quick-growing poplars and shrubs planted for sand-breaking demand continuous replanting and watering and ultimately have a notoriously low survival rate – as low as 30% nationally.

<IMAGE 2 HERE>

Holding the present in place is a continuous work, a Sisyphean expenditure of materials and labor for an infrastructure that is only ever evident in its breaking down and its need for repair (Larkin 2008: 235-6). It takes more and more to make sure nothing happens. Facing a coming burial, a politics of sand control demands an apparatus against time. It is a work of containment of the desert future in time and space that will align the “socialist ecological civilization” that state theorists call for (Pan 2007) no longer with progressivist emplotment of a ‘war against nature’ characteristic of the ideological pretentions of earlier moments in state socialism (Shapiro 2007).

Sand displaces that future into an ongoing now, with a politics that aims to continually maintain an unchanging present. It patterns an environmental-political endurance that neither knows nor expects release. It no longer demands any transcendent future, but only the simple continuation of existence. This is a politics animated through the urgency of keeping time and space in a condition of still-waiting, fiercely remaining in the “ontic condition” of a suspension that must not admit a final transition (Gupta 2015). Still on the horizon, the future is the space of a holding pattern that, if possible, can persist a few more years.

**SUCCESSIONS**

It is after dinner, but the sun has barely begun to set in the big, high summer sky. Naiman’s desertification research station in eastern Inner Mongolia, one of a dozen scattered around China’s desertification hot zones, buzzes into life as people settle in for evening activities. Summer field research feels like summer camp for the teams of ecologists, GIS experts, and hydrologists, dune scientists and engineers.

Li Ming, my ecologist friend who will take me to Minqin months from now, and Little Tu, a first-year ecology PhD, suggest that we walk the grounds behind the institute. Students and young professors like these do conduct the bulk of research at the station. As dusk approaches, they want to climb the watchtower, where we can watch the sunset while eating apricots from the tree near their dormitory. The paths on the institute’s grounds curve and meander through what Li Ming says were sand dunes just years earlier. Now, they are dense and unruly with branching shrubs, stands of small trees, and low, weedy grasses that spill over the footpaths. Climbing the watchtower, Little Tu muses that one day, before summer ends, they could light fireworks off the watchtower’s platform.

Looking back over the half dozen main buildings of the field station, then turning to face the horizon, Little Tu notices that the vegetation changes in thickness and density. She discerns a botanical gradient, from trees to shrubs to grasses, blotching into patches on the sand before thinning into bare yellow dunes. Li Ming, the senior of the two desert ecologists who is just starting his first position as a full-fledged state ecologist for the Chinese Academy of Sciences, listens to her. He left his hometown in China’s subtropical south with a romantic longing for the open landscapes of northern China’s steppes, and now, deserts. As she speaks, interpreting the patches of plants (Tsing 2015) in the late summer dunes, he interjects here and there to identify key grasses, shrubs, and trees, in Chinese and then in Latin: *shami*, *yanhao*, *shaliu*; *Agriophyllum squarrosum*, *Artemisia halodendron*, *Salix cheilophila*.

Little Tu, who is doing field research in Naiman for the first time, has the unenviable task of processing sand samples through a sieve with the back of a spoon for later experimentation. It is not my first time wandering on the grounds with researchers at the station, for whom the changing communities of plants are a living example of the powers of desert ecology to root dunes into place. Little Tu knows enough to know that the species that Li Ming names occur naturally on dunes in the region; and she knows that some of these plants, like the dwarf sand willows that have rooted closest to the station’s buildings, are strategic species for dune stabilization projects. Plant growth is a stabilization technique. Little Tu wonders aloud, “How many different kinds of plants does it take to fix a dune?”

“The number of species is not the important factor,” Li Ming replies, shifting subtly into a pedagogical mode, and now addressing both of us. “From here, we can see several species, all at once, so it looks like a single community of plants. But look, the species are not evenly distributed - there are trees there, but not at the sand’s edge.” Tracing his finger across the land, from the open dunes through the gradient of plant species, he invites us to see the subtle progression in plant communities as various discrete moments, plotting out sequential years.

Li Ming exhorts us to see the various communities as slices of time, a simultaneous diachrony across the dunes, with its beginnings on the open drifts and its endings in the stands of sand willows. He continues, “When we come back next summer, the way that the plants are distributed will be different again - trees will replace some of the shrubs, and shrubs will replace some of the grasses. The *shami* grasses will be denser, and there will be new *shami* in the sand. The ecology is more unstable and more fragile where there are bushes instead of trees, grass instead of shrubs, and sand instead of grass. It is still developing, and where there are trees it is more stable. We are not interested in the number of species, exactly, but in the stability of the ecosystem.” The graduated composition of species on the dunes is a way of emplotting dunes into a process of vegetation change.

This process is a version of the classical formulation of ecological succession, first pioneered in Cowles’ studies of vegetation on the dunes at the shores of Lake Michigan (1899) in the late 1800s, and then the Clementsian paradigm (1916) with its organismic underpinnings. Ecological succession charts a process in which dunes can be imaged as passing through successive botanical stages. According to the story of succession, on a denuded landscape, pioneer species establish and create the conditions for others. They are subsequently replaced by successor species that in turn create the conditions for their own overtaking and replacement by new species. Each stage stages the next, so that weedy pioneer communities are already inhabited by the promise of stable climax communities.

Ecological succession is a way of seeing sand at the intersection of multiple environmental processes, some of which can be mobilized against others - it is both a way of telling time on dunes and giving form for potential action into that time. Research in Naiman is an interdisciplinary enterprise, oriented toward developing dune stabilization techniques. Its original incarnation, in the 1960s, was as an environmental engineering institute, coordinating sand control projects alongside desert-crossing Tongliao-Beijing railway in a time when sand encroachment caused up to fifty derailments a year across the country (Wang & Zhao 2005). Principles of ecological succession allow state ecologists to see bare dunes as future forests, and to pose the mobility of bare dunes as the starting point of an ecological process that will culminate in stabilization. At the desertification research station, ecology is both a science for understanding the dunes as shifting arrangements of biotic and abiotic things, but it is also a tactical element in the enterprise of dune stabilization - ecology toggles between scientific practice and engineering technique. This doubling of ecological time is a research objective.

For scientists at the station, the ecological stabilization that Li Ming describes is fungible with the stabilizations demanded by sand control programs. Further into the process of succession and the approach to a stabilized ecosystem, plants tend to establish more densely, and the sand-securing capacities of deeper and more robust roots increase. Indeed, on the dune surveying trips that groups of students and scientists make each day, documenting plant species and estimating vegetation cover on a square meter of surface sand are ways of locating a dune on the quadripartite scale of dune mobility. Whether a dune is mobile, semi-mobile, semi-fixed, or fixed can be determined by the character of the vegetation on its surface. Ecological and geophysical stabilization appear as faces of the same sand-engineering process, and succession describes both an ecological process and a potential geo-engineering technique. On moving dunes, then, ecological succession opens ways of mining the sand for its biotic potential to unearth futures that oppose the unending advance of dunes across a landscape. As a competitive mode of sand-time, it allows dunes to exist perpetually at a crossing point between two sand-timelines: the mobility of encroaching dunes contends with ecological succession, wherein sand becomes self-stabilizing botanical substrate.

<IMAGE 3 HERE>

In ecological succession a bare dune is a starting point for a new process whose futures are already contained in the first weeds on a dune’s slope. Teacher Xia, an ecologist a few years Li Ming’s senior, insists that dunes are sites of ecological potential. She sinks a shovel and digs a hole less than a meter into the side of a dune to expose damp sand. “Look - sand is excellent for holding water and preventing desertification. These dunes can support robust plant life,” she insists, pointing to the dunescape as a massive reservoir for botanical stabilization. Xia’s desert, is, following Elizabeth Povinelli, a “space where life was, is not now, or could provide the conditions for life” (2015, 170). A water-sealing dune, she insists, is a potential habitat for sand-engineering plants, and for a scientific forestry that adheres to and mimics the principles of ecological succession.

*Pioneers and Kickstarters*

A restless dune is also a point of eco-geophysical intervention. It shifts from the result of desertification to a cusp between two modes of environmental time. At this cusp, the future is a site of technical intervention where “the sense of the present as ruined time” (Scott 2014, 12) is also the precondition for sand ecology to begin to root stability back into the land. Dune sands appear as both an aftermath of degradation and a growth medium for tenacious infrastructuralizing species. Ecological sciences assemble into a political toolkit that collects engineering techniques as tactical means of emplotting and realizing other futures. They aim to forcefully derail sand-time from one track to another, one where the desert is a future and not a future burial. It is a means of effecting a kind of temporal capture, whereby the beginning of the succession process already gestures at its completion.

It should be no surprise then, that although the stability of an ecological community is a goal, it is the beginnings of the process of stabilization that the scientists focus on. It is the pioneer species and not the climax community that student scientists are trained to notice. On an early morning dune surveying trip, a recent PhD and specialist in remote sensing Liu Jun leads a van full of students several dunes deep into Naiman’s Ke’erqin Sandy Lands. We follow him in a loose cluster in the depressions between the high slopes of dunes until he signals us to stop. He reaches down to pull up a tiny green sprig of a leaf, about the size of a clover. It pulls out easily of the loose sand, and several grains of sand hang delicately on its tender root.

“This is *shami*,” (Latin: *Agriophyllum squarrosum*) he says, a tenacious grass adapted to dry and unstructured sand. Looking around now, I notice that there is a sparse carpet of *shami* on many parts of the dune. I am not the only one who hasn’t noticed until now. “*Shami* grows quickly and it is one of a few plants that thrives on mobile dunes,” he says. “It may look like nothing, but shami is centrally important in allowing other plants to establish.” Pioneer species like *shami* are crucial not only because they are proof of ecological process, but precisely because they also change the soil conditions in ways that allow other plants to establish. In the sparse leaves and blades, it is possible to envision, with some imagination, shrubs and trees to come, on the surface of a stabilized dune.

Pioneer species, then, kickstart ecological time, promoting subsequent waves of colonization. They matter especially because they indicate the renewal of an ecological time already occupied by its projected realization. Many ecologists at the station study pioneer species. Li Ming and a team of ecologists are especially interested in studying a shrub, *yanhao* (*Artemisia halodendron*) to understand how it prepare sand as a habitat for larger flora. *Yanhao* can continue to grow on fixed dunes, and therefore limns stages of succession. A study published in 2014, coming out of research at Naiman, argues that *yanhao*, “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.” This starts a multiplier effect by which decomposing plant matter “accelerates leaf litter decomposition and nutrient mineralization” (183). In their conclusions, they suggest that *A. halodendron* 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. The manipulation and acceleration of successive communities of plants appear as part of a potential armory of sand-binding interventions, an engineering technique alongside and in tandem with infrastructures like grids. Indeed, ecologists discuss the straw and nylon grids as ways of engineering habitats for sand-pioneering species by creating tiny wind-shelters where shrubs and grasses can more likely root.

For the ecologists at Naiman, if dunes could be left alone and pioneer species could be allowed to establish, then ecology would take its course. Where much of contemporary ecology outside of China has shifted from the orderliness of succession to chaos ecologies (Worster 1990), these ecologists see the dunes as the site of a latent ecology just about to burst back into life. For them, ecological time propagates into a politics wherein succession is the template of an ongoing reactivation of time; its stagelike progressivism echoes, formally, that of Chinese socialism’s theory of itself[[5]](#endnote-5). As we sit on the institute’s watchtower, we face the sunset, looking where the open dunescape breaks into a patchwork of grasses and pioneer shrubs. Little Tu leans back, as if to linger for a moment in the quiet calm of a future always starting anew.

**CODA: FIVE THOUSAND YEARS**

It is often said that China has had a continuous history of five thousand years. At times, the cliché expresses a pervasive cultural chauvinism through the profundity of civilizational time. At others, it is a way of neutralizing the tumultuous recent past into the gravity of deep historical time. It was often presented to me by those involved in anti-desertification work as a subtle reminder that it is possible to describe environmental and human time in the same scale and timeframe. “Five thousand years” admits no necessary distinction or sense of a mismatch in speeds and scales, no singular event of the collision of nature and culture.

This phrase, “five thousand years,” is one I heard very often when I was with scientists driving through Naiman and its alternating patchwork of pastures, newly-opened farmlands, semi-degraded fields, and rolling dunes. Especially, it was deployed when I expressed surprise over how calm they seemed over the emergency of desertification. “Five thousand years” offers a trope through which they could explain to an outsider the ordinariness of this apparent disaster, subsuming its exceptionality into an account of ordinary environmental processes.

Tingting, a young hydrologist at Naiman station, for instance, thinks of the depth of time not in relation to permanence but rather as a reminder of the very transience of the present as a moment in a longer cycling. As our van speeds past the new furrows of a freshly-plowed piece of farmland in a grassland[[6]](#endnote-6)[[7]](#endnote-7), she chides me for imagining that this opening is a violence against a pristine nature:

All over China, places like this [...] 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 and graze [their animals] 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.

She is not elaborating a specific catalog of events, but rather the environmental form through which a temporality and process of environmental change can be imagined. The various kinds of landscape - dunes, pastures, fallow - rearrange as points in a process that extends backward and forward in time. Her account of the earth as a long cycle of the rising and falling social, economic, and ecological regimes recalls both the models of ecological disturbance and succession through which the scientists see a dynamic earth, but also the long cyclical returns of Chinese dynastic time (Levenson 1968). The opening of ‘new’ farmland, a primary driver of desertification, for her, is a re-opening, an indelible moment in a cycle that has lasted since time immemorial. It is proof of the perpetuity of the land as itself a process of change, one that is driven not by human agency as its author nor by the workings of an extra-human nature. Just as state ecologists comb bare dunes for signs of renewed succession, the telescoping of the variegated landscape into a tableau of a millennia-long social-economic-ecological cycle makes apparent endings the necessary grounds for new beginnings. For Tingting, the ‘disturbance’ is already implied as part of the ongoing operation of the cycle, just as its eventual rehabilitation is; it is the normal disaster.

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 that binds together the endurance of China and the endurance of the earth. Tingting’s earth is not an object but a process, gathering and bearing the effects of economic, ecological, and geophysical processes. ‘China’ and its difficult land urge a thinking with perpetual cycles that repeat with all the spontaneity and mystery of the changing seasons or the rise and fall of governments. In this long China, the earth is the substrate of its own time. Tingting offers an account of a landscape that has long been embroiled in human practices and yet cannot be called anthropogenic, if the term indicates human life as an excess over environments rather than a moment in them. In her earthly process, there is no need to understand the environmental present or future as a rupture in time, nor to ask for 5,000 years to bear itself as a history of trespasses[[8]](#endnote-8). Her landscape is an earthly history of endurances, where the earth, as this knot of processes, is the engine and measure of itself.

 Apparent endpoints become the proof of a cycle beginning again. The depth of time, where boundaries blur between the perpetuity of the state and the perpetuity of the land, offers a way of emplotting the environment as an entanglement of physical, demographic, economic, and climatic processes, without any need to pinpoint a moment in which one engulfs the other. What sand and the politics of its containment may offer are a gesture toward a different kind of politics in time: a politics formed through the earth and its many rhythms and materials. That is to say, the materials and processes that give shape to the earth and its changes, elicit and pattern political possibilities; they may evince political futures and tactics for shaping them.

As those most invested in sand control seek to contain it, temporalities of sand figure in diverse temporal formations. In this way, sand shifts subtly from an environmental problem open to pacification by technopolitical intervention, to become a key actant in shaping the governmental interventions meant to finally control it (Callon 1986). In many modes of encounter, more-than-human landscapes scaffold emplotments of political and environmental futurity that relay through more-than-human becomings. Sand becomes the material condition of a metahistorical form that emerges in complex physical, political, and ecological intra-action, even as it shapes new forms of political time.

The horizons of politics, in the worlds of sand control, take their shape through the horizons of the expanding deserts. The announcement of the Anthropocene must be taken as a challenge to unearth ways of imagining futures in more-than-human worlds, beyond the timelessness of Nature and the imminent endings of disaster environmentalisms. Vibrant, potent, and irreducible to human design (Bennett 2010), environmental materialities and processes displace and force open an anthropocentric temporal imagination. At the shores of the desert, we may yet discern in the sand ways of living at the end of the world, enduring its erosions or opening the future anew.

**ABSTRACT**

*This paper considers possibilities for posing the relationship between historical, political, and environmental time – a key provocation of what has been called the Anthropocene – by exploring how sand gives form to political time in Chinese state anti-desertification and sand control efforts. Through an ethnographic exploration of how scientists, engineers, and bureaucrats in two desertification emergency zones in northern China read landscapes through sand as a substance embroiled in multiple physical, geological, and ecological processes, this paper argues that sand emerges as a form not simply for apprehending alternative ways of accounting and narrating the passage and texture of passing time, but also for giving shape to the futures with which environmental politics in China must contend as well as composing a set of tactical techniques for intervening in and shaping environmental processes. As sand gives form to multiple chronological forms, it also reworks the chronopolitics of the grand futures of state-sponsored economic development into what I call holding patterns, techniques of environmental management shaped by earthly temporalities and aimed at hold the unruly time-spaces of moving sand in place. Sand’s motion and stabilization become the physical substrate for new modes of political fortune-telling, sometimes spelling out endings in the anticipatory spectacle of buried cities, but sometimes also providing the architecture for regenerative ecological futures.*

**Keywords** China; Environment; Sand; Temporality; Futurity; Anthropocene

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1. China’s anti-sand programs unfurl in a number of overlapping geographies, tracked to the various airstreams that make deserts into dust storm source areas for downwind places, and to the sprawling geography of field stations in key demonstration zones (Zee MS). Sand and wind, as the constituents of a dust storm, have not only reshaped the temporal horizons of political intervention, but laid the environmental architecture for new administrative zonings (Ong 2006: chapter 4) across and beyond northern China. [↑](#endnote-ref-1)
2. China’s semi-arid interior has for decades suffered massive desertification and has recently drawn scientific and journalistic attention for its epidemic of lake disappearances (Huo 2011). [↑](#endnote-ref-2)
3. I understand this work to be fundamentally consonant with the collaborative alter-speculations of the uncertain commons writing collective. “To divine,” they write, is to dream the future - namely, to live the present in the tense of the future anterior.” [↑](#endnote-ref-3)
4. It should be clear that this attention to the interaction of temporal forms across nonhuman and human registers is not bound to a primordialist conception of nature as a sphere outside of human intervention, or the raw material on which ‘culture’ acts (Strathern 1980). I am indebted to writers who have endeavored to theorize contemporary environmental being as already changed and therefore bearing an ongoing capacity to change, what Michelle Murphy, in a biotic idiom, has called “alterlife” (2015). [↑](#endnote-ref-4)
5. There is a much longer reflection through Chinese history on the nature of Chinese political time. Much of modern Chinese state political and philosophical thought has responded to the problem of how “to be modern *and* Chinese, that combination so desperately sought through a century of reformist and revolutionary exasperation as a seemingly immobile China and an all-too-kinetic West” (Levenson 1968:78). Stagist and progressivist conceptions of history provided and continue to provide an official historiographic form, not only for making sense of Chinese pasts but also for angling toward futures framed as a succession of state-announced stages. [↑](#endnote-ref-5)
6. The recent opening of new farmland in northern China, especially on pasturelands, is an effect of major national policy that demands the replacement of farmland lost to urbanization, especially in the densely populated south to retain a constant amount of total farmland. This follows upon large-scale agricultural conversion campaigns during the Cultural Revolution that significantly drove desertification in the utopian goal of “Making Grain the Key Link” by making historically pastoral regions into a bread basket through conversion to farmland. [↑](#endnote-ref-6)
7. The recent opening of new farmland in northern China, especially on pasturelands, is an effect of major national policy that demands the replacement of farmland lost to urbanization, especially in the densely populated south to retain a constant amount of total farmland. This follows upon large-scale agricultural conversion campaigns during the Cultural Revolution that significantly drove desertification in the utopian goal of “Making Grain the Key Link” by making historically pastoral regions into a bread basket. [↑](#endnote-ref-7)
8. Conversely, her accounting of landscape change in social-ecological succession lives little room for an accounting of actual changes in use patterns, especially in the last century. [↑](#endnote-ref-8)