

游牧民、技术专家： 21世纪的草原寓言

The Nomad, the Technologist:
A 21st Century Steppe Fable

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摘要 ……

本项目是一个以视频方式投射现实的寓言，一个以政治小说形式展开的设计项目。该项目将原始积累、生产以及景观生态学作为市场和经济结构的驱动力，通过展现与中国农业土地利用形式不同的蒙古草原生态过程，从而在市场的力量和景观设计学之间建立了联系。“游牧民、技术专家”项目起始于对蒙古戈壁沙漠进行的实地调研，考察了分布蒙古草原的资源开采场地——从奥尤陶勒盖和额尔登特矿区，到能够代表蒙古独特的“短暂城市化”的区域——乌兰巴托的游牧民季节性迁移。这一设计寓言项目提出了一系列能够应对经济需求的季节性波动、灵活可变的基础设施构建；利用飞机场、飞机库和传统景观元素，如冰盾（一种刻意形成的积冰）来构造一种与草原生态紧密联系的劳动力生态。设计方案以事实叙述作为表达方式，其视频虽以遥远的2020年为结束点，但其背景设定则是基于当代的环境条件和政治局势——中国为保障粮食安全以及基于农业的市场经济，展开了一场与荒漠化和草原进行的斗争。

关键词 ……

蒙古；市场；政治经济学

Abstract ...

This project is a projective fable in video format that positions political fiction as a design project. As primitive accumulation, production and landscape ecology are the driver of markets and economic structure, the project unpacks the contrasting ecologies of Mongolia's steppe to China's agricultural land use, establishing the connections between market forces and landscape architecture. The Nomad, The Technologist began with field research in Mongolia's Gobi Desert, examining sites of resource extraction across the Steppe — from the mines of Oyu Tolgoi and Erdenet to areas representative of Mongolia's unique forms of transient urbanization in Ulaan Baatar. This project of design fiction moves through a series of proposed infrastructural elements that are agile and mutable depending on seasonal fluctuations of economic needs, using air fields, hangars and traditional landscape elements such as naleds (intentionally created ice shields) to envision an ecology of labor that is tied to an ecology of the Steppe. Seeing this proposal as factual narrative, the video ends in the far future of 2020 but using contemporary conditions and political situations of today — China's battle against desertification and the Steppe as a mechanism to protect food security and a market economy based on agriculture.

Key words ...

Steppe; Markets; Political Economy

“……人类在19世纪慢慢接受了‘空间’的概念，而在20世纪需要面临的重大问题则是关于‘时间’的多样概念的共存状况。”

——克里斯·马克，《日月无光》

2023年，阿拉木图， 萨克斯坦。

我执笔于草原，为你讲述这个故事。

这一切开始于1992年，也就是苏联解体后不久。在失去了强大的邻国的支持后，蒙古经历着一场从公有经济向民主自由市场演变的和平革命。

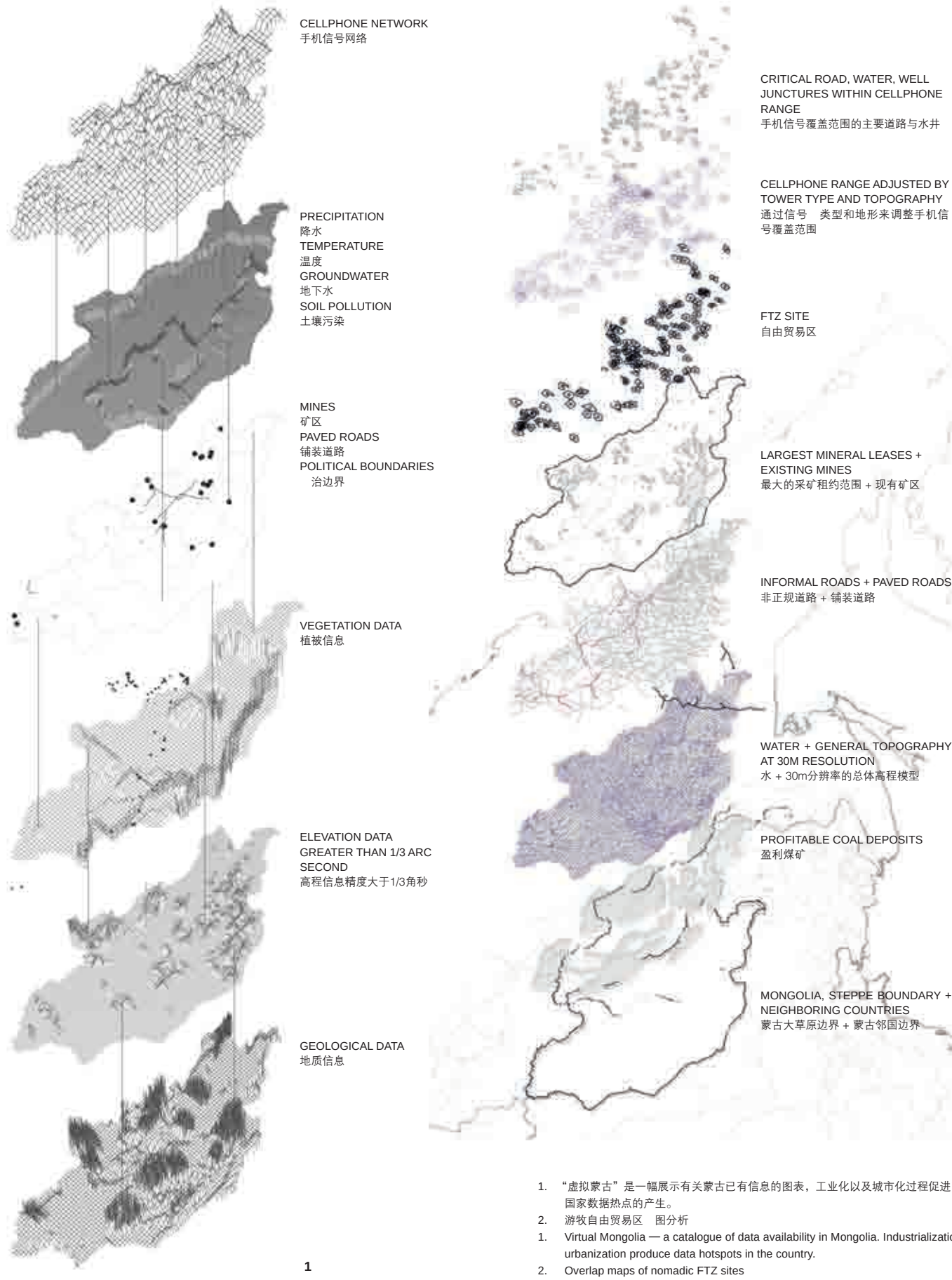
2009年，一系列的数据和信息告诉

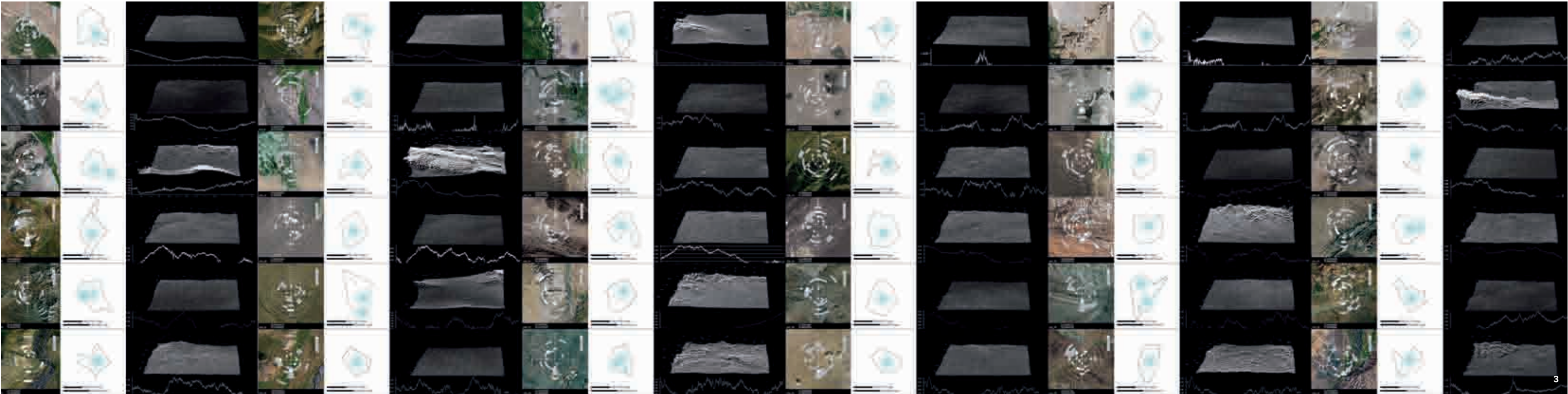
我们一个矛盾的事实：蒙古是一个具有埃里克·沃尔夫经济模式的发展中国家。这种矛盾并非源于不准确的经济计算，而是源于西方“普世标准”与地区特殊性之间的差异。蒙古的发展潜力依赖于其巨大的铜矿、煤炭和黄金储量。然而，资本的积累并非易事，对于一个以游牧业和丝绸之路遗产而闻名的国家，无论是其不均衡的发展模式，还是将货物送达市场的基础设施的匮乏，都是亟待解决的重大问题（图1）。

尊崇科学与技术的人们究竟在这一过程中忽略了什么？

为了寻找答案，蒙古 府召集了一批地理学家、经济学家、社会学家和规划专家，共同开展了一系列的研究。他们的任务是创造一种基于游牧科学与经济的发展计划。

研究团队中的一位年轻地理学家仔细地盯着一张蒙古地图，他意识到被忽略的事实。他发现了沿草原分布的一组相同的冲突与张力，并向其同事解释道：我们是“地理”的囚徒，基础设施的传奇——铁路、柏油马路、中央排水系统、丰碑式的工程建造——也无法改变这一事实；受“地理”禁锢的我们又同时处在被模拟的





事实的边缘之外，地理学家继续说道。西方的景观建立在假设的数据、被规范化的可耕性指数、材料可利用性与价值、战后遗存、布雷顿森林体系，以及多学科交叉的大科学基础之上。这些指标，即数据景观，将时间和空间混为一谈：他们用描述“那里”的空间性词语表示“那时”，地理学家说道。蒙古成为“具象世界中的幽灵”——因为其地图上并未显示过多建造的痕迹，而被看作是未开化之地。当西方世界已经进入信息劳动力和无形商品时期，我们仍按照世界银行一些报告中所显示的规划来进行采矿和放牧。

这位年轻的地理学家向他的同胞提议：如果我们大胆尝试西方国家曾经尝试，但最终未能实现的资本主义的高级形式，会有怎样的结果？我们如何跳过工业阶段，直接进入一种“短暂经济”阶段？

这位地理学家基于这一提议被委任为蒙古“十年计划”的负责人。

在2011年，尽管蒙古的经济发展重

心向采矿业转变，游牧型畜牧业仍在蓬勃发展。府向游牧牧民提供分散的能源基础设施，允许小型风能和太阳能设施为电视、卫星天线和手机供电。牧民以超低价格将羊绒和羊毛出售给邻邦中国。他们常年沿着已在蒙古草原上留下印记的固定的土路进行贸易往来。在缺乏牧草储备的饲料短缺的季节，大量牧民涌入首都乌兰巴托以寻找短期雇佣工作。

尽管拥有丰富的矿产资源，蒙古的经济仍然停滞不前——连接蒙古和亚洲的洲际千禧高速公路项目仍未修建完成，因而无法将资源运输并进入全球经济网络。

2012年，十年计划开始生效。年轻的地理学家说，经济的停滞不前缘于被遗忘的“时间”和“空间”。

通过分析游牧业和采矿业的命脉所在——水井、道路和河流交叉口以及获得遍布草原的网络的基础——现有手机信号的通信基础设施——十年计划小组锁定了遍布蒙古草原的133个地点（图2，

3）。通过重新启用早年的旧商队旅馆或旧贸易站，“十年计划”将游牧民组织起来，建立一个能够跨越辽阔地域、进行高效商品运输的国有物流公司——包括游牧民们吃苦耐劳的骆驼、牦牛和快马，以及苏联留下的200架货运飞机（图4）。这133个营地般的“游牧自由贸易区”属于季节性的临时性聚居地，并反映了草原独特的治生态。

2013年，该地理学家已经完成了“逆向工程指标”的制定，即一种针对“游牧城市化”的随机模型。

地理学家对这一游牧贸易指标的解释如下：

我们可以通过对数据进行抽象化处理

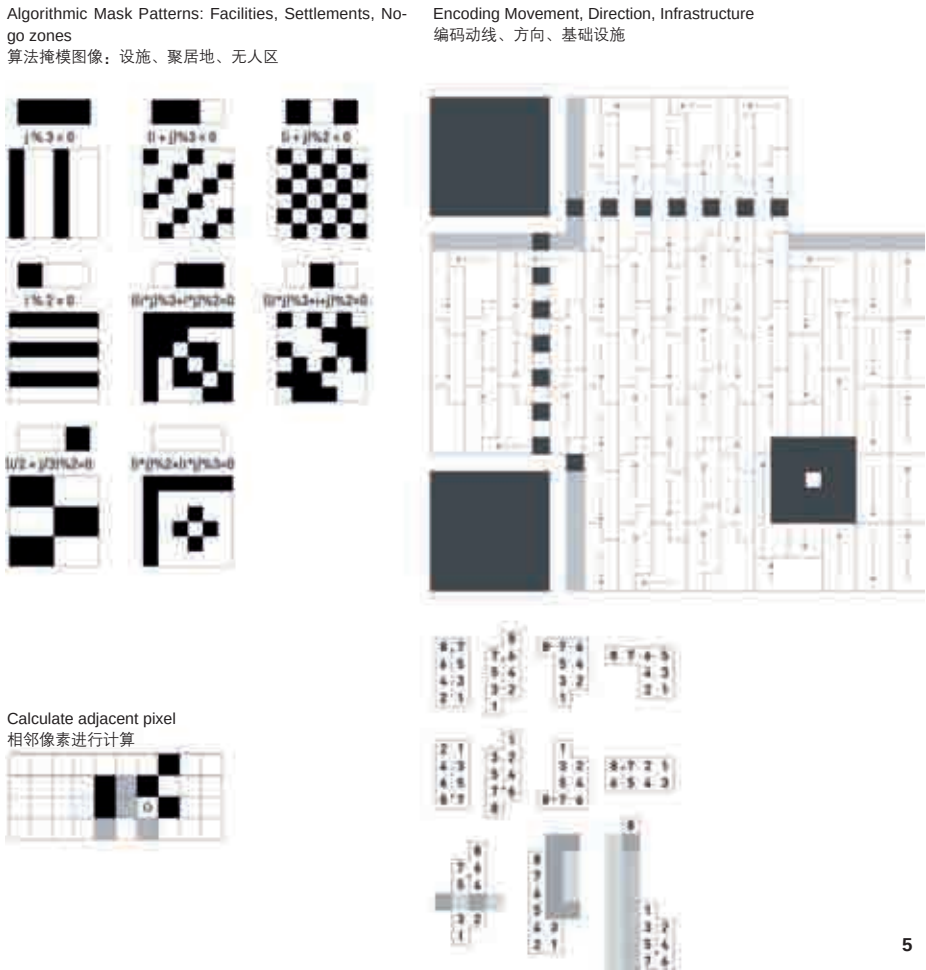
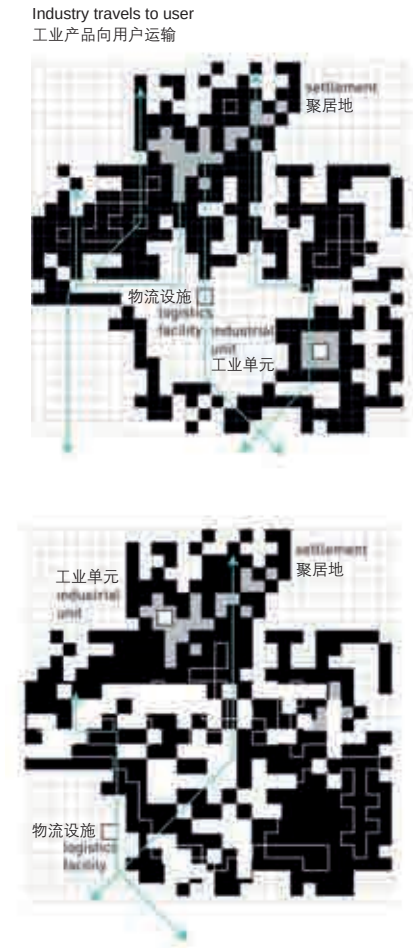
3. 蒙古大草原中133个自由贸易区其中的42个及其生态信息

4. 物流运输表：“十年计划”将牧民组织成一个国有物流公司。

3. 42 of the 133 proposed FTZs with ecological data across the Mongolian Steppe

4. Logistics Vehicles Catalog: the Ten Year Plan utilizes nomadic pastoralists to form a nationalized logistics company.

Logistics Vehicles Catalog 物流运输表						
运输类型 Transport Type	可用量 Available Quantity	速度 Velocity	载货量 Cargo Capacity	空间限制 Spatial Constraints	摄入/输出 Input/ Output	
 骆驼 Camel	532,846	40 km/hr	700 kg	Turning radius > 3m 转弯半径 > 3m	Input: 600 kJ/day Output: 2000 liters manure per day	输入:600千焦/天 输出:2m³粪便/天
 马 Horse	4,373,872	50 km/hr	113 kg	Turning radius > 2m 转弯半径 > 2m	Input: 2000 kJ/day Output: 5000 liters manure per day	输入: 2 000千焦/天 输出:5m³粪便/天
 牛 Cattle	4,843,842	50 km/hr	300 kg	Turning radius > 5m 转弯半径 > 5m	Input: 4000 kJ/day Output: 68 kg manure per day	输入:4 000千焦/天 输出:68kg粪便/天
 牦牛 Yak	4,843,842	40 km/hr	1000 kg	Turning radius > 5m 转弯半径 > 5m	Input: 2000 kJ/day Output: 5000 liters manure per day	输出:2 000千焦/天 输出:5m³粪便/天
 安东诺夫-24型军用运输机 Antonov- 24	200	450 km/h	5,500 kg	8,400 m	950 liters/hour	0.95m³/小时
 安东诺夫-2型军用运输机 Antonov- 2	45	190 km/h	2,200 kg	4,500 m	150 liters/hour	0.15m³/小时



重塑现实，并将自身置身于地图环境中。我们首先将数字高程模型抽象化，将其转变为一系列地形数值的索引。利用这些数值，我们可以通过一个概率矩阵来预测可能的移动路径，即随机矩阵。

作为一个随机矩阵，系统将最终达到稳定状态。矩阵中每一个单元格的数值，将根据包括风、水、手机信号范围、地质沉积物在内的权重 加而改变。通过这一运算，点到点之间的移动路径就可以被模拟出来。这也解释了聚居地是如何产生的：他们源于临时性的聚集（图5，6）。

地理学家走访了位于蒙古南部的奥龙奥沃特矿区。该地区从前属于渺无人烟的远郊地区，现在已有2 000户家庭，以及500名在附近金矿工作的矿工。冬季，游牧矿工们在金矿附近淘金。地理学家将“时间”作为工具，对目前蒙古草原现有的游牧与采矿过程进行了重新整合及强

化。这些过程相互促进，并且每一个过程都巧妙成为“基础设施回路”中的重要组（图7~11）。

该系统操作开始于将一个原有砂石矿区修建一个飞机场——这一过程中将利用矿石开采过程中所产生的表层渣土，并将现有库棚转变为能够容纳不同季节多样活动的“容器”。由库棚排列两侧的机场跑道形成了一条临时物流通道，其方向由风向决定并位于一条现有道路上方，可供车辆和飞机使用。

库棚建造在毛毡材料的基础结构之上，并采用其他本土木材。库棚底部通过雨水收集而形成牲畜饮水池；其内部可容纳4架安东诺夫24型运输机以及一个信息通讯技术中心。在冬天，库棚侧面的弧线结构可用以储存青贮，而库棚内部既可被用作停留居所，又可利用从机棚垂下来的毛毡构 进行空间分隔，形成兼具邮

收货功能以及羊绒产品加工处理的市场。

作为随季节变动的物流用地，聚居地缩小或扩大的过程将通过探矿的遗留物所调节：探矿过程在景观之上留下由“阻力感测器”所形成的网络，他们通过响应当地水源供应与土壤稳定性情况，生成游牧帐篷和牲畜圈的最佳分布排列模式（图12，13）。

春夏两季增长的游牧迁移将根据季节需求转变角色：以开采为主的夏季，他们将被用于矿石运输；而以勘探为主的春季，他们将用于探矿与地图信息采集。这些非正式的动态迁移道路，也成为播撒梭梭种子的路径，从而为草场和聚居地建立起一道风障。

在冬季，游牧采矿变成了创造冰盾的常规活动。冰盾是一种源于苏联的技术，其通过凿穿冰层让水溢出从而形成厚度达8m的厚积冰。除了自由贸易区内现有的

水井可为聚居地提供饮用水，冰盾亦能够储存饮用水以应对春夏干旱季节需求（图14）。

现存水井周边建立起可提供社会性聚集的公共浴室。其设计在前苏联浴室模式上有所改造。浴室的水蒸汽透过墙面缝隙向外扩散，成为茫茫草原上休憩的信号。水蒸汽模糊了路人的视线，如同一块被错误放置的砖块，一扇记忆之窗，抑或是吸引着那位年轻地理学家来到此地的草原的未来

我停笔于三年前的2020年。“十年计划”接近尾声并获得了前所未有的成功。无论蒙古文化曾经如何，它都已转变了模样。

为建立新的市场，一批长期通过蒙古扎门乌德来往于中蒙边境的商人，开始在其姐妹城市 连浩特——距扎门乌德8km的中国边境城镇——搭起了帐篷。这些商

人在很早以前起就开始助长灰色经济，将中国货物销往蒙古与俄罗斯。现在，这些蒙古商人已经不再满足于自己的 治版图，开始“占领” 连浩特的边缘——那里具有前苏联风格的聚集地与白色帐篷，使得过往的蒙古人称其为“20年前的乌兰巴托”。

到今天，中国通过兴建基础设施来刺激经济的发展方式已经逐渐衰落；大量建造的铁路和公路最终被闲置。如同几千年前一样，中国需要再次抵抗来自蒙古游牧经济的叛乱者的入侵。他们发动了一场与草原本身对抗的运动——他们试图通过“绿色长城”项目将国土与这些“狡猾”的商人隔开。

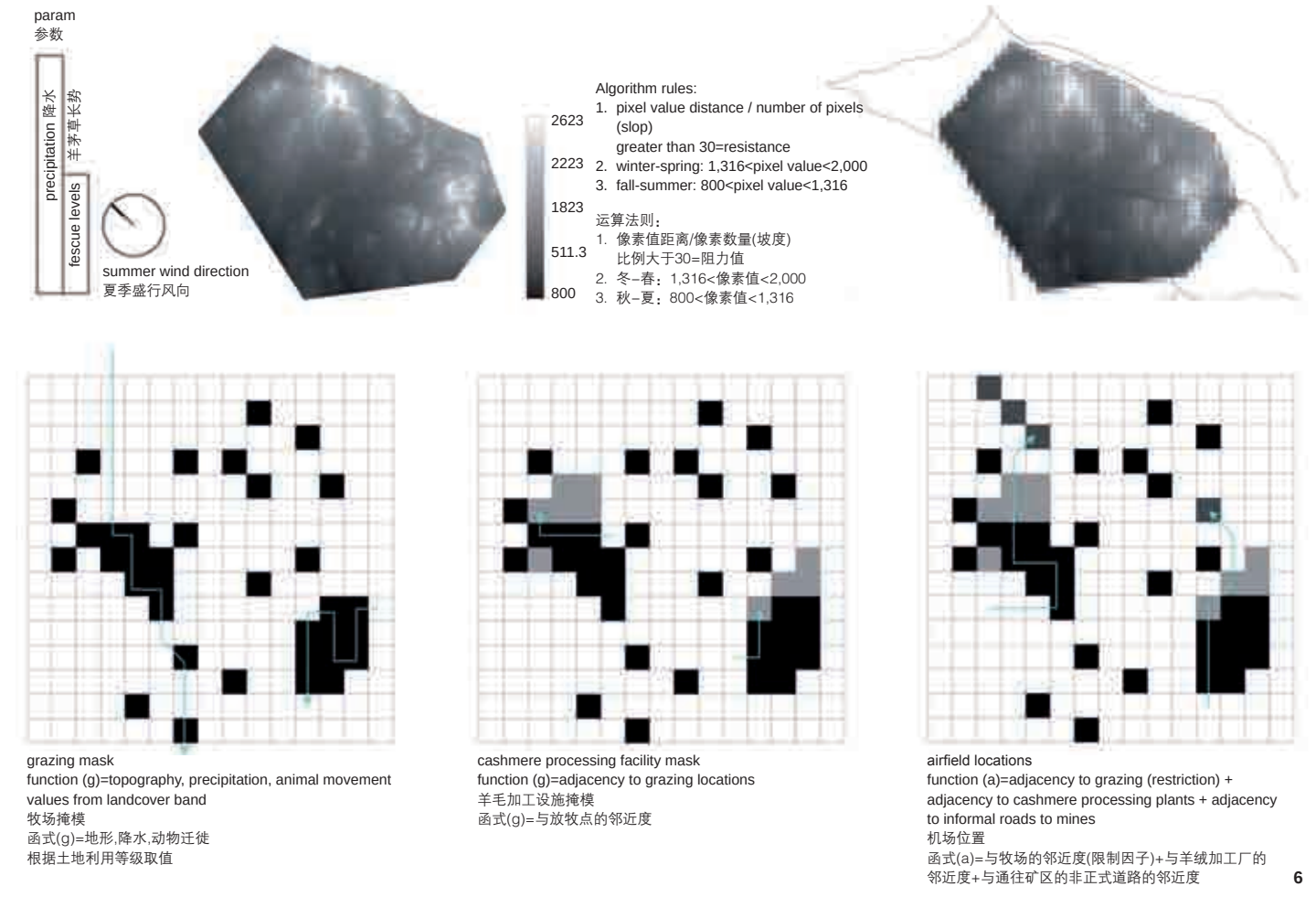
那位如今已不复年轻的地理学家对这一变化感到十分震惊。当看到蒙古商人如今竟然变得比中国商人更擅长于廉价商品交换时，他开始思索：多年前他所设想的

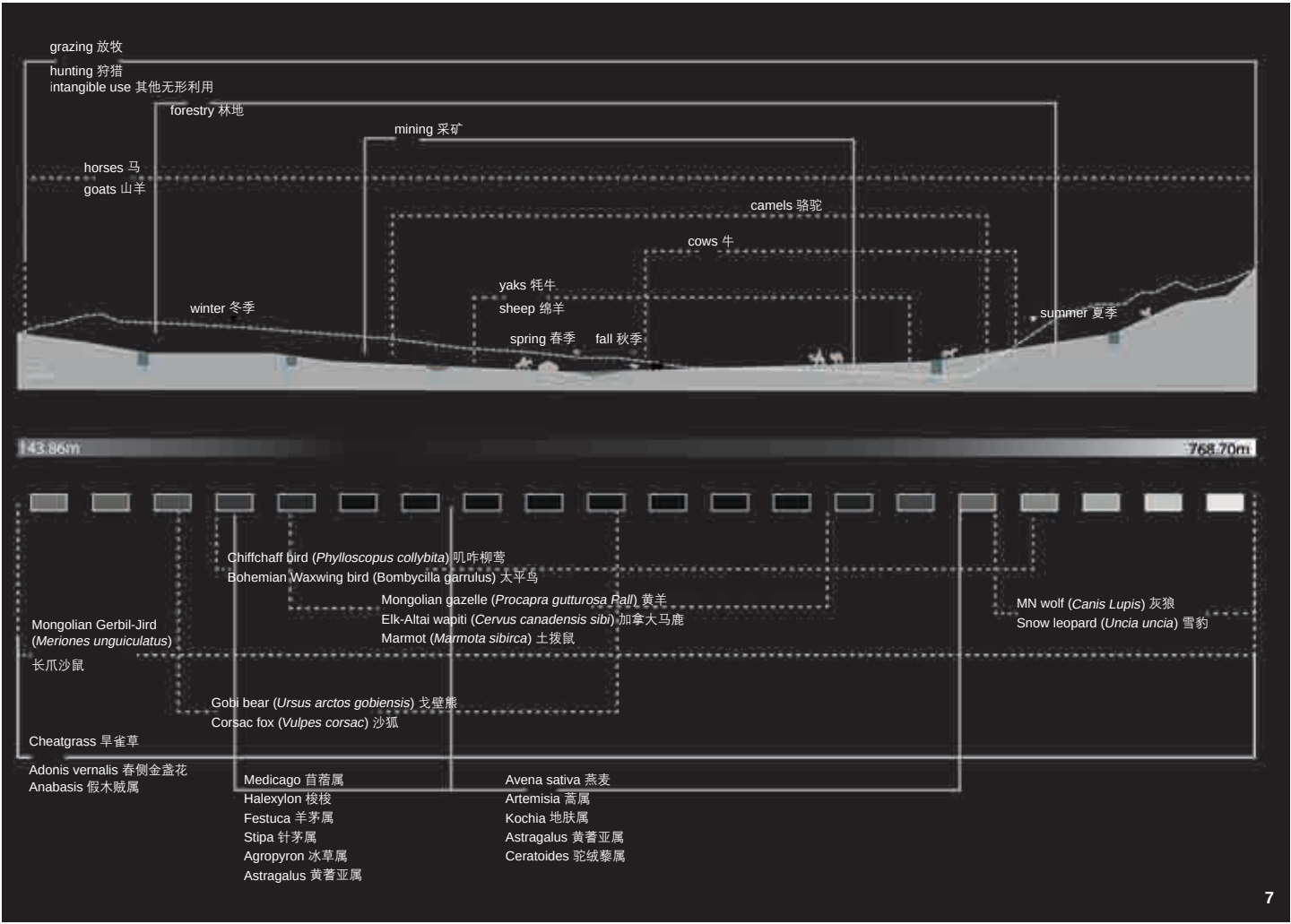
自治到哪里去了？他不由得回想起十年前的浪 设想，一种介于数据和技术启发，普世性与特殊性，严谨的参数化和奔放的浪 之间的理想场景。

他回想起自己的祖父曾说过，“草原是广阔的，人类是渺小的。草原对众生一视同仁。”无论对于怎样的场所与任何浪 传奇，时间都将向我们揭示关乎生存的真相。他站在奥龙奥沃特矿区的边界上，眼前是曾经遍布这广袤景观并勾勒出其地形的敖包，如今已被作为“现代敖包”的信号发射 所取代。

一个简单的现实是：事无恒久。LAF

5. 资本主义高级形式：矩阵-移动-事。
6. 基于对第34号场地的数字高程模型的抽象化的随机矩阵
5. Advanced Capitalism: matrix-movement-event.
6. The stochastic matrix based the abstraction of the Digital Elevation Model of Site No.34.





“... in the 19th century mankind had come to terms with space, and that the great question of the 20th was the coexistence of different concepts of time.”

— Chris Marker, Sans Soleil

The year 2023, Almaty, Kazakhstan.

I am writing from the Steppe to tell you this story.

It begins in 1992, shortly after the fall of the Soviet Union. Without the support of their large neighbor, Mongolia undergoes a peaceful revolution, transitioning from communism to democracy and free markets.

In 2009, the realm of numbers and words tell us that Mongolia is both a wolf economy

and a developing country, a contradiction that results from the tension between the universal and the particular rather than any inaccuracy in economic calculation. Mongolia’s development potential lies in vast quantities of copper, coal and gold. Yet capital does not come so easily, whether it is the equations of uneven development or the lack of infrastructure to convey goods to market, a stunning problem for a country known for its nomadism and legacy of silk road routes (Fig. 1).

What did the men of science and technology overlook?

For answers, the Mongolian government convenes a group of geographers, economists, sociologists and planners to embark on a

series of studies. They are tasked with the development of a nomadic science and economic plan.

Staring at a map of Mongolia, a young geographer in the research group recognizes it. He finds the same set of collisions and tensions along the Steppe. We are the prisoners of geography, he tells his colleagues, unable to be remedied by the romance of infrastructure, of rails, asphalt, central sewers, and monuments of engineering. We prisoners of geography are also outside the boundaries of simulacra, he continues. Western landscapes have been constructed from imaginings of data, normalized indices of arability, material

good availability and wealth, artifacts of post War, Breton Woods, Big Science. These indices, these datascares, conflate time and space as one, he says, they mark “over there” as “back then”. We are made savage, “a specter in a world of appearances”, by being unconstructed on a map. While the western world enters the labor of information and immaterial goods, we remain mining ore and herding sheep in the plans of some World Bank Report.

The young geographer proposes to his compatriots: what if we embraced an advanced form of capitalism succeeding where Western countries try for but fail at?

How do we skip the phase of industry for an economy of transience?

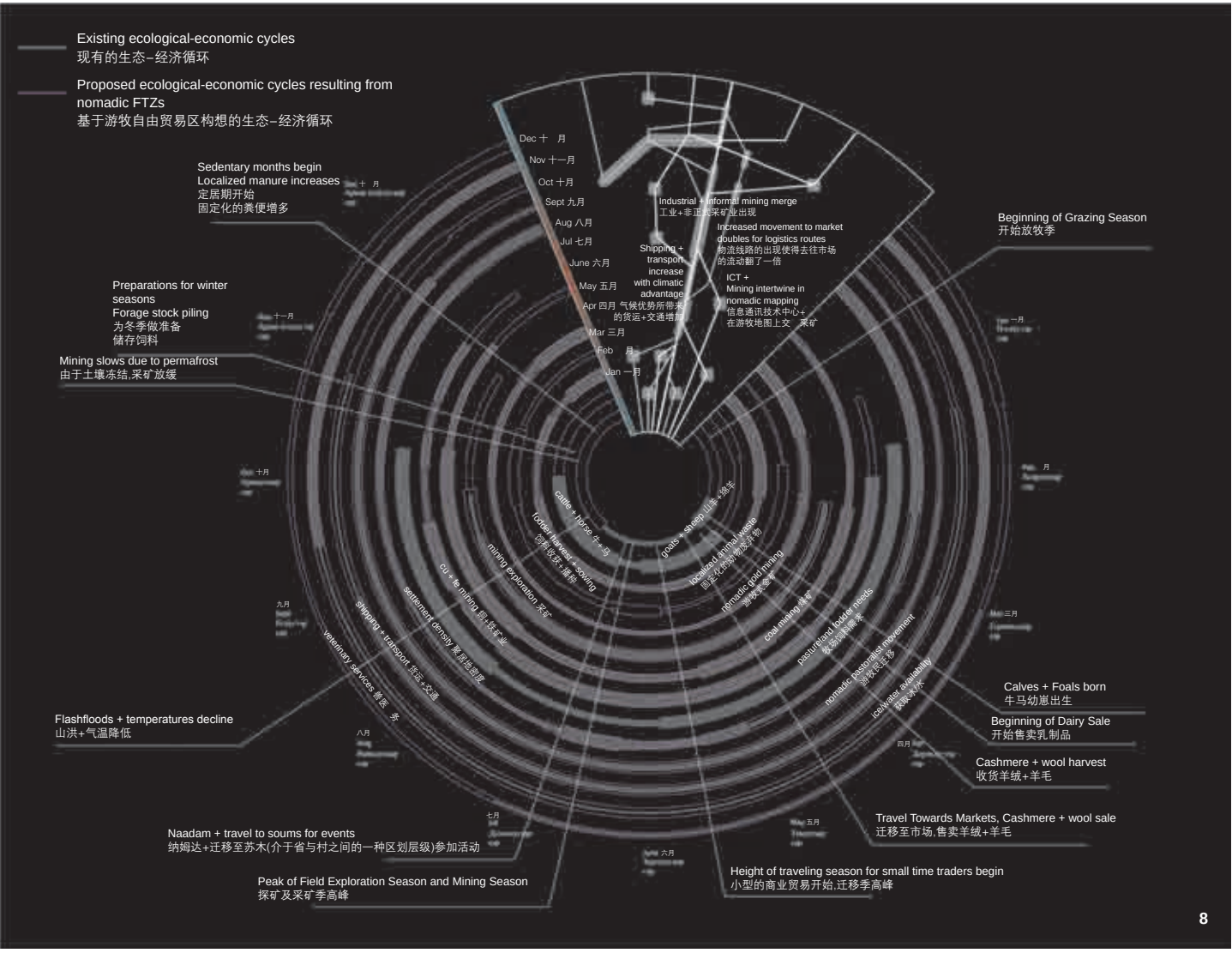
With this, the geographer is made head of the Ten Year Plan.

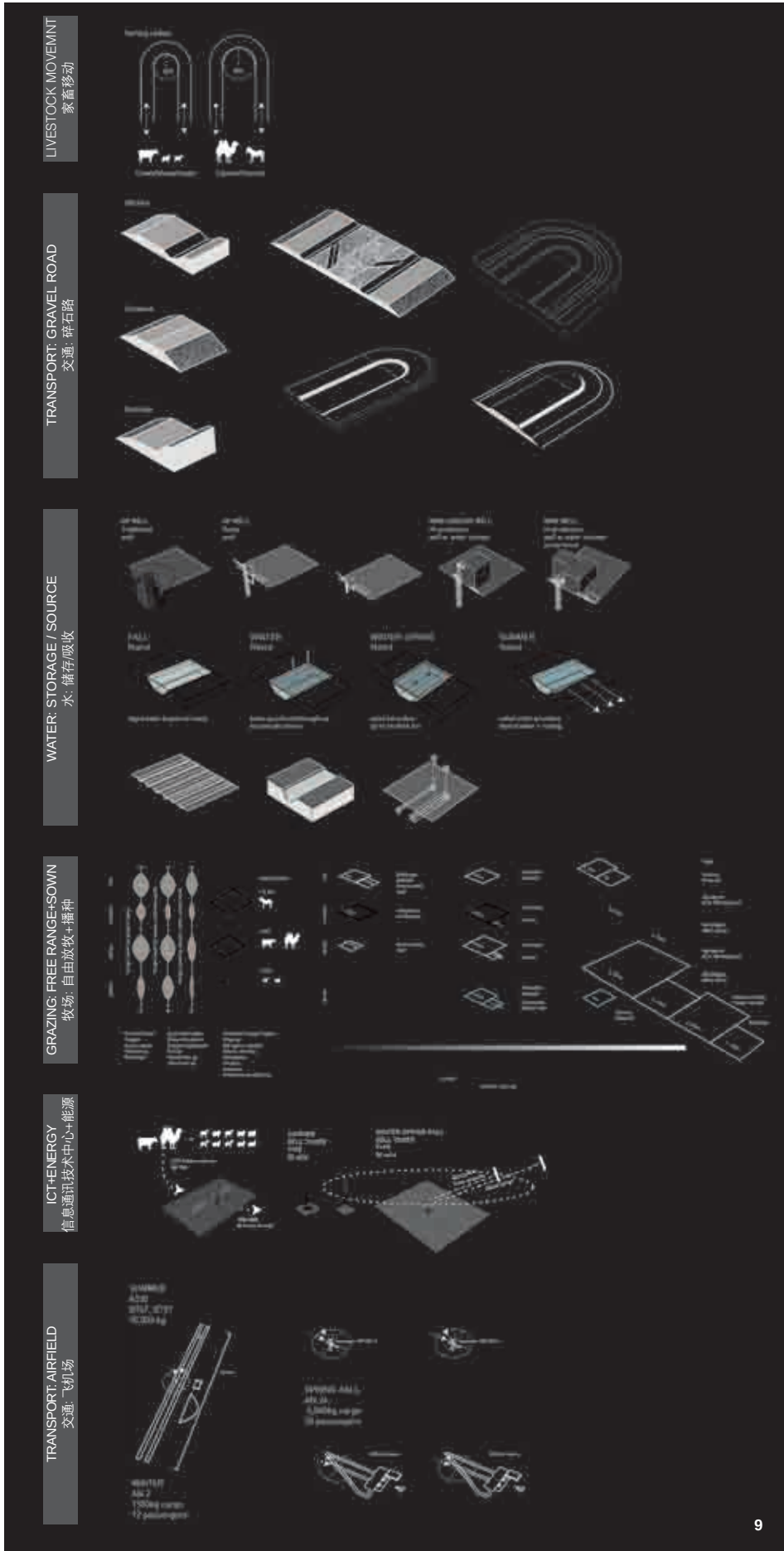
In 2011, nomadic pastoralism still thrives despite the shift towards a mining economy. Disperse energy infrastructure is provided by the government for nomadic pastoralists, allowing small scale wind and solar energy to power televisions, satellite dishes and cellphones. The pastoralists sell valuable cashmere and wool to its neighbor, China, for severely undervalued prices. They engage in coordinated, regular movement along dirt roads that have etched themselves into

the Mongolian steppe. Pastoralists flood the capital of Ulan Baatar in search of waged labor during livestock forage shortages when there is little stored fodder.

Despite the promises of mineral wealth, Mongolia is in stasis — the intercontinental Millenium Highway project to connect Mongolia with Asia remains unfinished, unable to deliver all that is solid which melts into air.

- 7. 草原活动的海拔范围（草原剖面）
- 8. 现有的及构想的生态-经济循环
- 7. Altitudinal range of Steppe activities (the Steppe section)
- 8. Existing and proposed ecological-economic cycles





In 2012, the Ten Year Plan takes effect. Stasis, says the young geographer, is merely a forgetting of time and geography.

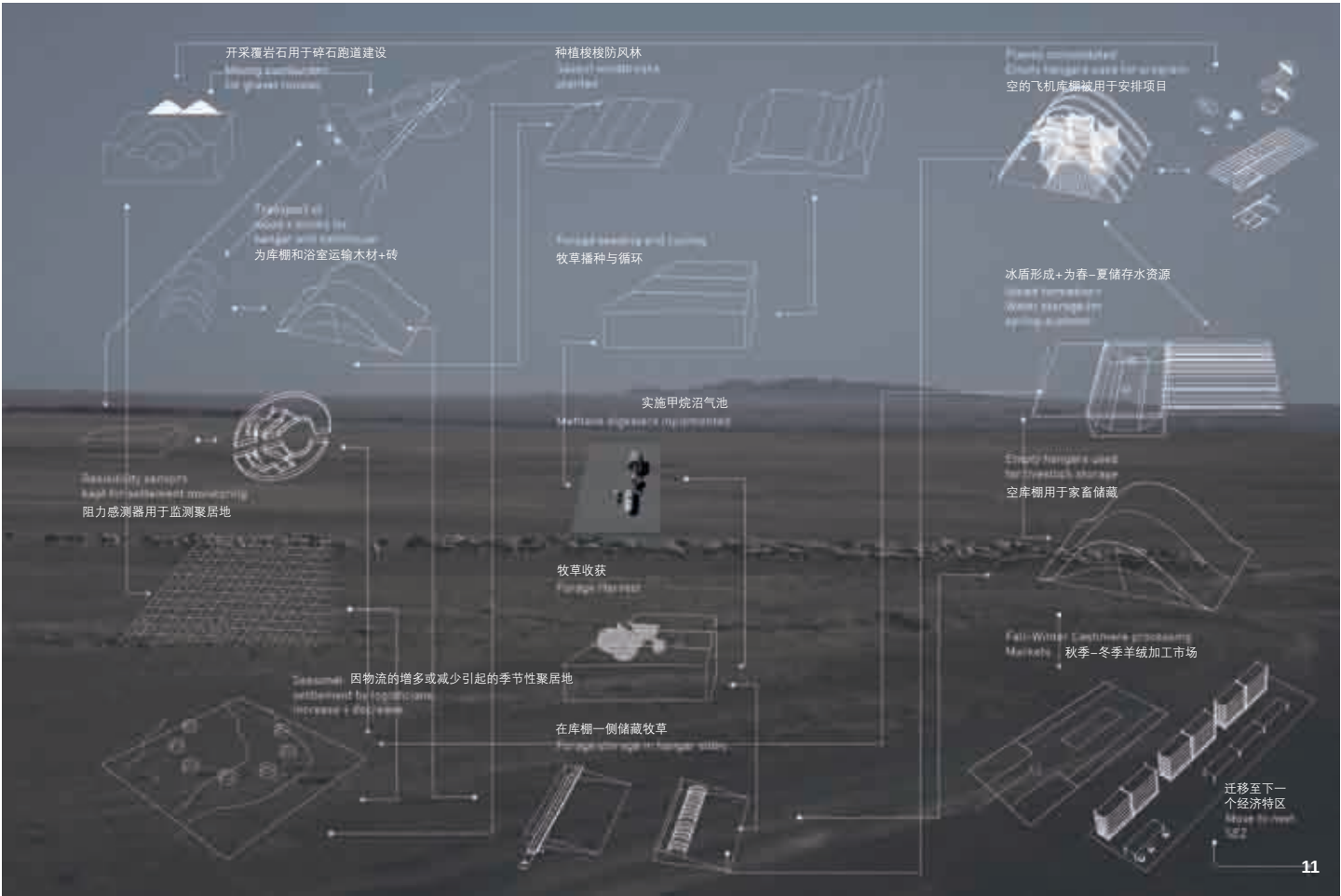
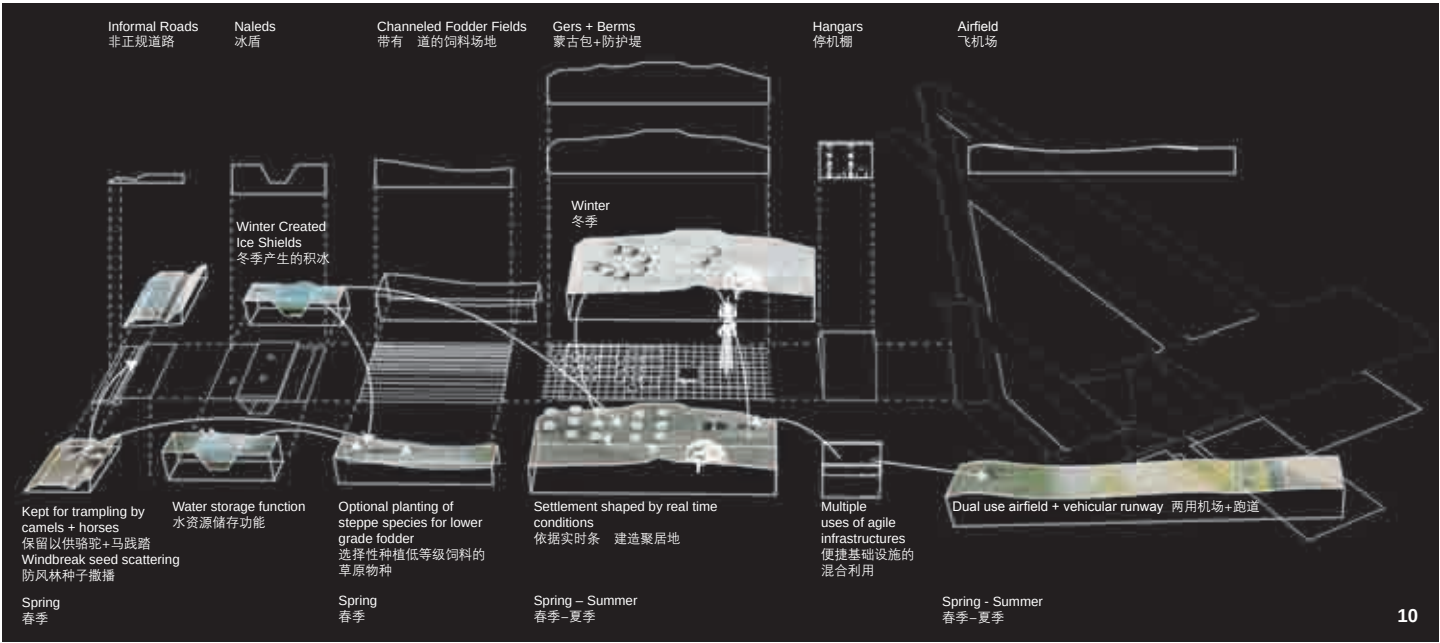
The team identifies 133 sites across the Mongolian Steppe, through seeing the vitals of nomadic and mining economies — wells, road and river junctures and the key to pervasive networks: information telecom infrastructure of existing cellphone towers (Fig. 2, 3). Exhuming the old model of the caravanserai, or trading post, the Ten Year Plan utilizes nomadic pastoralists to form a nationalized logistics company, with their hardy camels and yaks, fast horses, 200 leftover cargo planes from the Soviets, capable of the most efficient transport of goods across vast territory (Fig. 4). These camp-like, nomadic FTZs are temporary sites of seasonal settlement that change seasonally, a reflection of the Steppe’s political ecology.

By 2013, the geographer finishes work on his reverse engineered index, a stochastic model of nomadic urbanism.

He explains his nomadic trade index:

In our abstraction of data, it is our chance to create reality itself, to place us on the map. We begin with the abstraction of the Digital Elevation Model, an index of topographic value. Using these values, we can predict the probability of movement through a matrix of probability; the stochastic matrix.

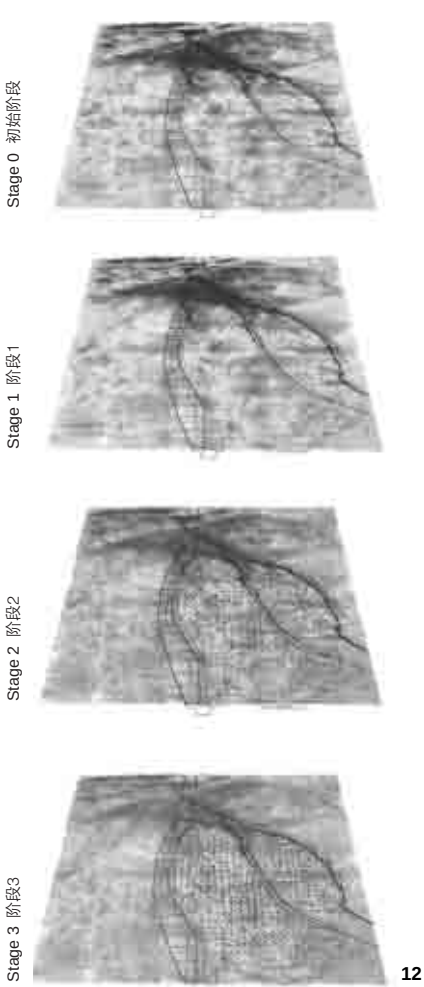
As a stochastic matrix, the system will eventually reach steady state. Each cell’s value can be changed according to weighted addition — of wind, water, cellphone availability range, and geologic deposits. Movement is then modeled through this, and shown to us is how settlement happens: temporary agglomeration (Fig. 5, 6).



The geographer visits the site of Olon Ovoot, in the southern region of Mongolia. Formerly a remote, unsettled site, it is now home to 2,000 households

and 500 miners who work in the nearby gold mine. Nomadic miners also wander through in the winter, panning for gold. To the notion of time, the geographer

rearranges and amplifies existing processes happening along the Mongolian steppe. These processes accelerate each other and manifest themselves into an infrastructural

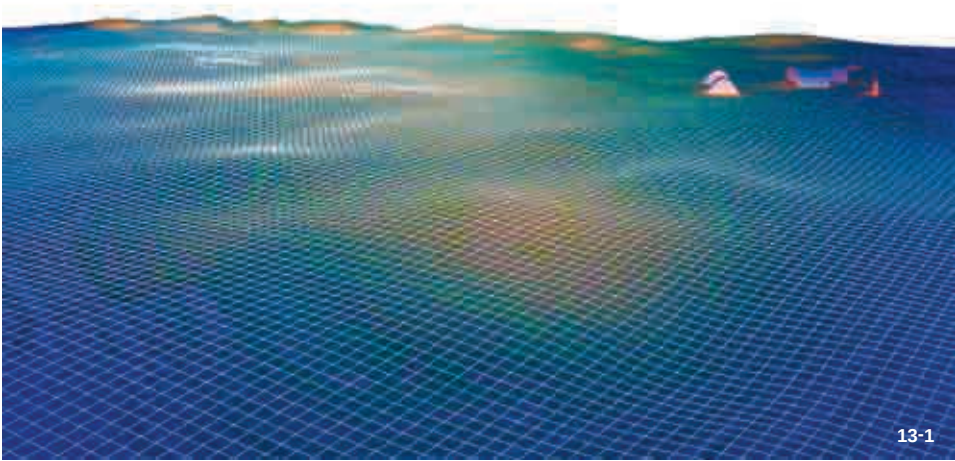


circuitry of components (Fig. 7 ~ 11).

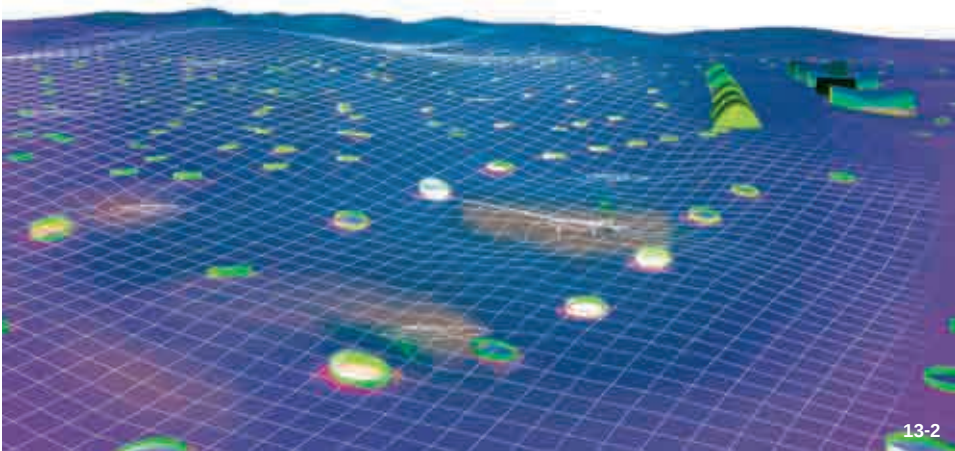
This system's logic operations begins with the creation of an air field from gravel mine overburden and its hangars, adaptive containers for seasonal program. The airfield runway, determined by wind, sits on top of an existing road allowing for vehicular and plane use, creating a temporary logistics corridor buffered by airplane hangars.

The hangars are constructed atop felt foundations and other vernacular materials. They collect water at their bases forming livestock pools, and inside, allow space for four Antonov-24 planes and an ICT center. The side curves allow the storage of silage for winter time, when the hangars are used as holding shelters or subdivided using

Pre-Camp 营地建立前



Post-Camp 营地建立后



suspended felt partitions, for markets which are simultaneously post offices for receiving goods and cashmere processing.

As logistics sites, seasonal contraction and expansion of settlement is mitigated by the leftovers of mining exploration — a network of resistivity sensors that create responsive patterns and arrangements of nomadic tents and livestock corrals responding to water availability and soil stability (Fig. 12, 13).

Increased nomadic movement in spring and summer is used for transporting ores during summer mining, and the same movement used for mineral exploration and mapping during spring prospecting season. This movement is also the vehicle in which

saxaul seeds are scattered along informal roadways, creating a windbreak for the forage fields and overall settlement.

Winter time nomadic mining becomes formalized for creation of naleds, a Soviet technology of 8 m thick ice shields formed by puncturing holes through ice. These naleds store drinking water for the spring-summer droughts, supplementing the water from existing wells in the FTZ sites (Fig. 14).

Built at the existing well sites are the bathhouses, the social condensers. Its design is a mutation of existing Soviet bathhouse typologies. Steam escapes from the bathhouses; a signal of rest along the steppe. The same steam obscures the gaze of passers by, although it is one mislaid brick, a window of

memory, or was it future, that lures the young geographer in...

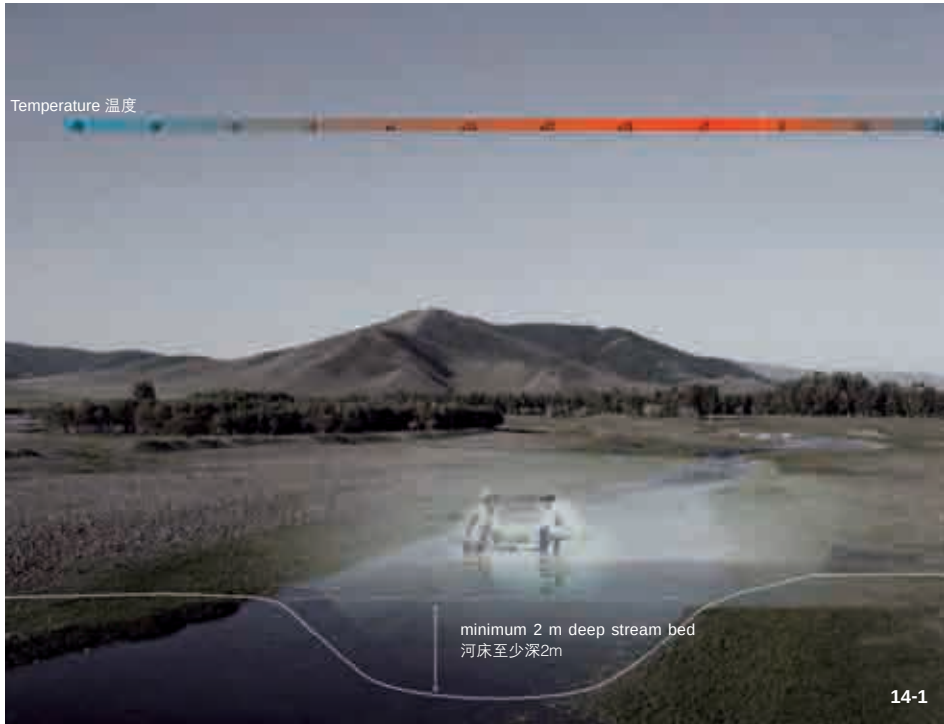
My letter to you ends in 2020, just three years ago. The Ten Year Plan is near completion, overwhelmingly successful. Whatever Mongolian culture was, it has disappeared.

For fresher markets, group of long time traders who have been always doing the border crossing from ZamynUud set up camp in the sister city of Erlian, the Chinese border town 8 km away. These traders have long fueled the gray economy, bringing Chinese goods through Mongolia and Russia. Dissatisfied with their political territory, these Mongolian traders begin to colonize the edge of Erlian, an image that Mongolians passing through call “Ulan Baatar twenty years ago” at the sight of Soviet style blocs and white tents.

By now, China’s economic stimulus method through infrastructure building has lagged; only so many rails and roads can be built to remain unused. China again resists these nomadic economic insurgents just as it did thousands of years ago, launching a campaign against the Steppe itself, to detach the land from these clever entrepreneurs by amplifying a Great Green Wall Project of Steppe destruction.

The geographer, who by now is not so young, is alarmed by this turn of events. As the Mongolian traders become even better at this exchange of cheap goods than the Chinese, he wonders: what happened to the autonomy he so imagined? He thinks to his passing romance of ten years ago, a romance between data and technological aspirations, the universal and the particular, parameters and poetry.

He remembers what his grandfather told him. “The steppe is vast and man is small. The steppe takes no sides.” Like all places, like all romances, time comes to pass for the



truth of survival. He stands on the edge of Olon Ovoot, seeing former ovoos that dotted the land, marking topography. It is now the cell towers that are the modern ovoos.

The simple fact: the impermanence of things. **LAF**

- 12. 基于地形的转变阶段
- 13. 从矿藏开采遗留下来的“阻力感测器”为游牧帐篷和牲畜圈养提供了有效的模式与安置。
- 14. 库棚在冬季存储水资源并在夏季提供降温。
- 12. Stages of topographic transformation
- 13. Network of resistivity sensors leftover from mining exploration that create responsive patterns and arrangements of nomadic tents and livestock corrals.
- 14. Creation of naleds that store water during the winter and provide cooling during the summer.