


RESEARCH ARTICLE

Making Use of the Land: The Political Ecology of China's First Empire

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Abstract

This article uses a case study of the Qin Empire to explore the ecology of an agrarian political system, analysis that has become possible because of the archaeological excavation of Qin administrative documents. Qin's power derived from photosynthesis, and its empire mobilized this energy and used it to conquer territory and expand its productivity. The state's power was based on its ability to extract taxes in grain from its subjects, store it in granaries, and then use it to feed laborers working on state projects. Grain and most other taxable materials were too bulky to move very far, so the government relied on a subcontinent-wide system of information gathering and processing that allowed officials at the capital to make decisions about local resource use. Qin's centralized bureaucratic system became the standard model of political organization in China, so it offers clues into the effects subsequent empires would have on their environments.

Keywords: Early Imperial China; Qin; environmental history; agrarian empires; labor; taxation

If the population exceeds the territory, then one should open up new land; if the territory exceeds the population, then one should set about calling in colonists.¹

The Book of Lord Shang

I first presented this paper to the Harvard Environmental History Working Group and later presented versions of it at several conferences and lectures. I would like to thank the participants in those events, and two anonymous reviewers, for their comments. "Making use of the land" is how both translators of *The Book of Lord Shang* translate the phrase *ren di* 任地 in its sixth chapter: Jan J.L. Duyvendak, *The Book of Lord Shang; a Classic of the Chinese School of Law; Translated from the Chinese with Introduction and Notes* (London: A. Probsthain, 1928), 215; Yuri Pines, *The Book of Lord Shang: Apologetics of State Power in Early China* (New York: Columbia University Press, 2017), 159.

¹Duyvendak, *The Book of Lord Shang*, 111 (modified); Jiang Lihong 蔣禮鴻, *Shang jun shu zhuzhi* 商君書錐指 (Beijing: Zhonghua, 1986), 6.42.

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In 221 BCE, soon after defeating his last rival and declaring himself the “First Emperor,” the ruler of Qin sent his armies north to build a wall.² Hundreds of thousands of unpaid workers—soldiers, convicts and corvée laborers—worked for a decade to connect existing walls and build new ones. This first “Great Wall of China” is traditionally portrayed as a geopolitical divide between pastoral nomads and agrarian Chinese empires, but we can also understand its construction as an episode in China’s environmental history. The workers who built it ate grain and wore clothes produced by millions of taxpaying farmers on land whose diverse ecosystems had been replaced with agricultural ones. Their food, ceramics, and metals were all made by burning wood, and many of their buildings and tools were also made from wood, taking a toll on already disappearing woodlands.³ And although some sections probably consisted only of watchtowers, the walls that were built divided arid regions of the north from wetter regions to the south, blocking wildlife from essential seasonal migrations in search of fresh pasture or shallower snow. The Great Wall was just one of Qin’s megaprojects, but it exemplifies the ecology of political power in China’s first empire.

China’s environmental problems are well known, but historians are just beginning to reveal their long histories.⁴ China’s ecosystems were turned into farmland so long ago that when most people imagine its “natural” landscape they picture idyllic agricultural villages rather than forests home to rhinos, tigers, and deer.⁵ While environmentalists elsewhere focus on saving wild animals from humanity, environmental efforts in China are more often focused on saving humans from their own industrial pollution. Over the past few millennia humans have transformed lowland China’s environments so completely that environmentalists and biologists can be forgiven for turning their attention to other issues, leaving historians to reconstruct China’s lost ecosystems and figure out how human civilizations managed to destroy them so thoroughly. It is difficult to avoid the conclusion that civilization itself is the problem: the more land used to feed people, the less there is for other species. But what was it about Chinese civilization that made it so successful at reorganizing its landscape to provide for humans? A key factor has been China’s long history of centralized bureaucratic governments, which have been among the most sophisticated in the world for over two millennia and have consistently incentivized the expansion of agroecosystems. Scholars have long recognized that ancient Chinese states have played important roles in transforming their environments, but until recently the

²*Shi huangdi* 始皇帝 could more properly be translated “first majestic deity,” but I will use the more conventional “emperor.” On the Long Wall, see Sima Qian 司馬遷, *Shi ji* 史記 (Beijing: Zhonghua, 1959), 88.2565; William H. Nienhauser, ed., *The Grand Scribe’s Records 7: Memoirs of Pre-Han China* (Bloomington: Indiana University Press, 2006), 361–62; Gideon Shelach, “Collapse or Transformation? Anthropological and Archaeological Perspectives on the Fall of Qin,” in *Birth of an Empire: The State of Qin Revisited*, edited by Yuri Pines, Lothar von Falkenhausen, Gideon Shelach, and Robin D.S. Yates (Berkeley: University of California Press, 2013), 113–38.

³Brian Lander, “Deforestation in Early China: How People Adapted to Wood Scarcity,” in *The Cultivated Forest: People and Woodlands in Asian History*, edited by Ian M. Miller, Bradley Camp Davis, Brian Lander, and John S. Lee (Seattle: University of Washington Press, 2022), 1–19.

⁴Robert B. Marks, *China: An Environmental History*, 2nd ed. (Lanham: Rowman & Littlefield, 2017).

⁵I use “nature” and “wild” to refer to species and environments not created by or dependent on humans, which should be understood as a spectrum rather than a dichotomy. On the complex history of “nature,” see Raymond Williams, “Ideas of Nature,” in *Culture and Materialism* (London: Verso, 2005), 67–85.

only specialists in early Chinese history who studied these questions were those in China and Japan.⁶

This article will use a case study of Qin, the state that founded China's imperial system, to demonstrate how political systems are also ecological systems. After the fall of the Western Zhou state in 771 BCE Qin was just one of the many states fighting over subjects and territory. But it gradually grew in strength and eventually, in 221 BCE, Qin succeeded in destroying the multi-state system and replacing it with a centralized empire. It is fitting that "Qin" is the origin of the word "China" since Qin founded the imperial system that played a central role in building the nation-state we now call China.⁷ Given that the People's Republic of China is home to almost one fifth of humanity and is also the world's largest carbon emitter, the importance of tracing the environmental genealogy of its political system should be clear. But Qin can also help us think more broadly about the importance of states in transforming the world's environment. Qin's role in expanding agriculture, increasing population, building infrastructure, and opening new lands to colonization and resource extraction has much in common with other powerful states, both ancient and modern.

Early Chinese states, like all political systems, were made possible by the domestication of plants and animals. Agriculture provided agricultural surpluses that supported political organizations. All of the energy in agrarian states came from photosynthesis, but states could only access this energy by mobilizing the grain and labor of farmers, so maintaining control over people was the key to political power. The development of states was a pivotal event in global environmental history because the centralization of political power gave small numbers of political elites the power over the rest of the population, and thus the power to decide how land is used and people's labor is expended. And since agriculture was the basis of their economies, agrarian states had strong incentives to occupy and populate new territory, promote the growth of human populations, and encourage agricultural intensification. By encouraging the spread of agroecosystems, which included both domesticates and associated species like weeds, fleas, rats, and cats, states increased the power of human societies to replace complex natural ecosystems with much simpler agricultural ones. States also had to manage these simplified ecosystems to ensure that they could continue to extract resources from them.

Until the 1970s scholars knew relatively little about Qin, but China's construction boom has unearthed so many archaeological materials that Qin has become one of

⁶European-language books that discuss environmental aspects of early Chinese states include Karl Wittfogel, *Wirtschaft und Gesellschaft Chinas* (Leipzig: CL Hirschfeld, 1931); Mark Elvin, *The Retreat of the Elephants: An Environmental History of China* (New Haven: Yale University Press, 2004); Ruth Mostern, *The Yellow River: A Natural and Unnatural History* (New Haven: Yale University Press, 2021), and Brian Lander, *The King's Harvest: A Political Ecology of Early China from First Farmers to First Empire* (New Haven: Yale University Press, 2021). In China, scholars of historical geography (*lishi dili*, a subfield of history rather than geography) have long studied environmental topics, as does Wang Zijin's 王子今, *Qin Han shiqi shengtai huanjing yanjiu* 秦漢時期生態環境研究 (Beijing: Beijing daxue, 2007), but none of these works focuses on the ecology of political organizations. Two Japanese works have considered environmental aspects of Shang Yang's reforms: Hara Motoko 原宗子, "Nōhon" *shugi to "ōdo" no hassei: kodai Chūgoku no kaikatsu to kankyō* 2 「農本」主義と「黄土」の発生：古代中国の開墾と環境 2 (Tokyo: Genbun Shuppan, 2005); Muramatsu Kōichi 村松弘一, *Chūgoku kodai kankyōshi no kenkyū* 中国古代環境史の研究 (Tokyo: Kyūko Shoin, 2016).

⁷On the word "China" see Paul Pelliot, "Cin," in *Notes on Marco Polo*, vol. 1 (Paris: Adrien-Maisonneuve, 1959), 264–78.

the best documented ancient states. In particular, excavated tombs and wells have yielded caches of legal and administrative documents written on wood and bamboo. These provide us with a detailed picture of how the empire worked from the perspective of those who ran it.⁸ In this paper I employ these documents, as well as other archaeological evidence and traditional histories to analyze the ecology of the Qin Empire at the height of its power during the reign of King Zheng/The First Emperor (r. 246–210 BCE). Qin established a network of administration across the subcontinent that mobilized the surpluses of its subjects to build infrastructure, often at scales far larger than any previous state could have achieved. Its roads, canals, and bridges facilitated the movement of people and resources, while its dams and dikes transformed hydrological systems to improve farmland. Qin was one of the most invasive states in the ancient world, and its demands on people's surplus grain and labor were so onerous that eventually it was overthrown by disgruntled subjects. But its system was quickly revived by the Han Empire, which was roughly equal in power and size to the contemporaneous Roman Empire but had a considerably more sophisticated administration.⁹ The Han Empire lasted for over four centuries (c. 200 BCE–200 CE), and firmly established the centralized bureaucratic model of government as the standard form of political organization in China, which it remains to this day.

This article will begin by reviewing the origins of Qin's system and the geographical organization of the empire, and will then discuss how information moved across the empire. The next section describes how the grain collected in taxes was stored at granaries and distributed to the laborers who worked both on routine building and maintenance and on Qin's infamous megaprojects. Much of the labor Qin's subjects performed, from digging ditches to conquering new land, involved transforming environments in some way. The final section will review the state's use of non-agricultural resources and the laws that it issued to encourage the sustainable exploitation of plants and animals.

The Rise of Qin

Qin is famous for being the shortest Chinese dynasty, having collapsed only fourteen years after King Zheng declared himself "the First Emperor" in 221 BCE. But Qin had already existed for well over five centuries by then, so it is also in a sense the longest dynasty in Chinese imperial history. Qin was initially a small polity that bred horses for the Western Zhou dynasty (1046–771 BCE), but when the latter fell Qin took over its homeland in the fertile and well-defended Guanzhong Basin of modern Shaanxi Province.¹⁰ The fall of the Zhou left a power vacuum in which dozens of small polities fought one another and a few larger states gradually conquered and absorbed the others. By the Warring States period (481–221 BCE) only a handful of large territorial states remained. As in early modern Europe, increasingly expensive inter-state warfare forced governments to develop administrative methods that could increase their revenues and

⁸The most up-to-date works on the Qin Empire in English are those of Maxim Korolkov, including *The Imperial Network in Ancient China: The Foundation of Sinitic Empire in Southern East Asia* (New York: Routledge, 2022); and "Between Command and Market: Credit, Labour, and Accounting in the Qin Empire (221–207 BCE)," in *Between Command and Market: Economic Thought and Practice in Early China*, edited by Elsa L. Sabattini and Christian Schwermann (Leiden: Brill, 2021), 162–243.

⁹Samuel E. Finer, *The History of Government from the Earliest Times, Volume 1: Ancient Monarchies and Empires* (Oxford: Oxford University Press, 1997), 524–36.

¹⁰Li Feng, *Landscape and Power in Early China: The Crisis and Fall of the Western Zhou, 1045–771 BC* (Cambridge: Cambridge University Press, 2006), 262–78.

their ability to wage war.¹¹ Qin's long history overlapped in time with the Assyrian, Achaemenid, and Mauryan Empires and with Alexander's conquest of Central Asia. We can be sure that some news of their existence arrived in East Asia with the nomads who moved across the steppe.¹²

In the early centuries of Qin's existence most states were highly decentralized. Their rulers were closer to "first among equals" than autocrats. As in the classic model of feudalism, each kingdom was composed of the domains of various aristocratic families that were nominally subordinate to the ruler but were often his most dangerous rivals. To strengthen their states, rulers had to take over the land and subjects of these rivals and those of neighboring states. As powerful states grew by swallowing up the land and subjects of many small polities, they created a class of impoverished aristocrats who became ideal officials in their increasingly bureaucratic administrations. In order to access as much of the surplus grain and labor of the population as possible, states strove to dismantle extended kinship-based organizations into separate nuclear families, each of which would pay taxes and provide corvée and military labor directly to the state. This required an administration capable of registering each household, which was gradually developed over the course of the fourth and third centuries BCE. In addition to extending control over agricultural populations, states also took over resources that had previously been outside of state control, like forests.¹³

These state-strengthening reforms occurred in all of the competing states, but only those in Qin are well recorded. Chinese tradition attributes most of Qin's political innovation to one man, Shang Yang, even though the process began before he arrived and continued after he was executed in 338 BCE. Essays written by his school of state-strengthening reformers are collected in the *Book of Lord Shang*. They display a belief that farming was the key source of wealth—or at least wealth accessible to the state—and that non-agricultural activity was parasitic.¹⁴ They argued that the state should take control of non-agricultural land and force foragers to start farming and paying taxes: "If mountains and wetlands are unified under the control of the state then those who hate farming, are lazy, or are greedy, will have no way to obtain food. With no way to obtain food they will have to farm, and when they farm, uncultivated land will be brought under cultivation."¹⁵ It was much easier to exploit people's surpluses if they lived in one place and produced crops on land that could be measured. While scholars have assumed that the long transition from mixed subsistence strategies to intensive farming was a kind of natural process, the example of Qin makes clear that state power played a role in encouraging the transition towards modes of production that could be taxed.

¹¹Victoria Tin-bor Hui, *War and State Formation in Ancient China and Early Modern Europe* (Cambridge: Cambridge University Press, 2005).

¹²William Honeychurch, *Inner Asia and the Spatial Politics of Empire: Archaeology, Mobility, and Culture Contact* (New York: Springer, 2015).

¹³On the general trends in this period, see Cho-yun Hsu, *Ancient China in Transition: An Analysis of Social Mobility, 722–222 B.C.* (Stanford: Stanford University Press, 1965); Mark Edward Lewis, "Warring States Political History," in *The Cambridge History of Ancient China: From the Origins of Civilization to 221 B.C.*, edited by Michael Loewe and Edward Shaughnessy (Cambridge: Cambridge University Press, 1999), 587–650.

¹⁴On Shang Yang (a.k.a. Gongsun Yang 公孫鞅) and his school, see Pines, *The Book of Lord Shang*.

¹⁵Jiang, *Shang jun shu zhuzhi*, 2.12. For yi 壹 meaning "unified under the control of the state," see Martin Kern, *The Stele Inscriptions of Ch'in Shih-Huang: Text and Ritual in Early Chinese Imperial Representation* (New Haven: American Oriental Society, 2000), 13, 18, 42, 44, 47.

Shang Yang's school recognized that people would prefer to avoid farming because it is strenuous and avoid fighting because it is dangerous. In order to make people want to farm and fight, they argued, the state had to reorganize society to make these the main routes to social and economic success. To this end, they advocated replacing aristocratic privilege with a system of ranks which men could earn by fighting in Qin's armies. Each increase in rank was awarded with various benefits, including farm plots. To provide this land, the state took direct control over large areas and reorganized them into strips of a standard width to make it easy to redistribute it according to rank.¹⁶ These land grants were not hereditary. Every man had to earn his own rank rather than inheriting it from his father. Maps and satellite images of North China reveal that some areas of the landscape are divided into strips that are close in width to the standard 332 meters stipulated in Qin and Han law.¹⁷ It would require careful fieldwork to prove it, but I suspect that these areas were laid out in early imperial times and have not changed much since. In later times the standard field widths grew larger, so the field strips in the 330-meter range probably date to the Qin-Han period.

The writings of Lord Shang and his school call for an enormous amount of state control over society and the landscape, so much so that it is difficult to imagine any ancient state putting these ideas into effect. And because the standard narratives of Qin history were written in the subsequent Han Dynasty, scholars have often assumed that Han historians exaggerated Qin's power to make Han rulers look moderate. However, excavated documents reveal that this system was actually established—at least in some areas—and became the basis of Qin's ability to conquer all of its rivals and establish the first Chinese empire. Qin has traditionally been vilified as a despotic state, but it is worth recognizing that Qin promised all households eleven acres of land even if they held no rank at all. It thus provided its subjects with something in return for their taxes and service, a vaguely socialist economic model often overlooked in discussions of Qin politics. We have no sources on what the common people of this time thought about this—or anything else—but it is worth considering that an attack on aristocratic privilege combined with a meritocratic rewards system was probably popular among some segments of society. It would have created a class of people who benefitted from the reforms and had some loyalty towards the state.

Shang Yang's system exemplifies James Scott's idea that states transform landscapes and society to make them easier to administer. Scott lists a variety of methods modern states have used to make society simpler and more legible: "the creation of permanent last names, the standardization of weights and measures, the establishment of cadastral surveys and population registers, the invention of freehold tenure, the standardization of language and legal discourse, the design of cities, and the

¹⁶Anthony J. Barbieri-Low and Robin D.S. Yates, *Law, State, and Society in Early Imperial China: A Study with Critical Edition and Translation of the Legal Texts from Zhangjiashan Tomb No. 247* (Leiden: Brill, 2015), 699–711; A.F.P. Hulswé, *Remnants of Ch'in Law: An Annotated Translation of the Ch'in Legal and Administrative Rules of the 3rd Century B.C. Discovered in Yün-Meng Prefecture, Hu-Pei Province, in 1975* (Leiden: Brill, 1985), 211–15.

¹⁷The pioneering article on this topic is Frank Leeming, "Official Landscapes in Traditional China," *Journal of the Economic and Social History of the Orient* 23.1/2 (1980), 153–204. As for official measures, one *bu* was about 1.386 meters long, and a Qin official field was 240 *bu* long, 1.386 x 240 = 332.6m.; Endymion Wilkinson, *Chinese History: A New Manual* (Cambridge: Harvard University Asia Center, 2013), 551–58.

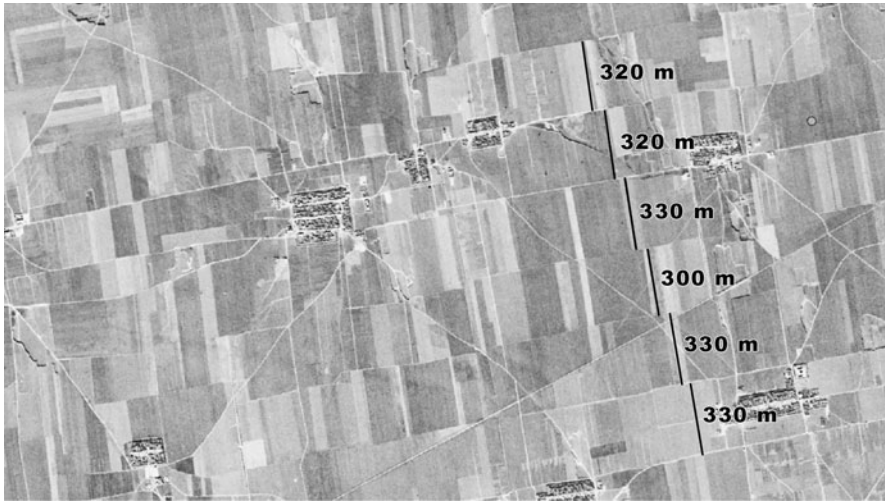


Figure 1. Satellite image of an area to the northwest of Qin's capital, Xianyang. I have added black lines and their lengths to show that the width of many of these field strips is close to the Qin-Han standard of 332 meters¹⁸

organization of transportation.”¹⁹ This list is astonishing because Qin established all of these except freehold tenure, and it certainly transformed land tenure. In short, Qin has much in common with many early modern states, and probably went further in simplifying society according to administrative logic than any other ancient empire. But Qin collapsed, and it can be considered an experiment in how intensively an agrarian state can administer its population—an experiment whose failure provided an important lesson to subsequent Chinese rulers.

During its final century, Qin's reforms helped make it a superpower. Within a few generations it conquered all the other states in East Asia, expanding from a kingdom the size of Portugal to an empire as big as Western Europe.²⁰ At its brief height, Qin's territory included most of the flat arable land in East Asia and tens of millions of subjects. Qin's power extended across temperate East Asia from the edge of the Tibetan Plateau to the Pacific Ocean. Most of the people in the empire lived in the arable lowlands of the middle and lower Yellow River valley. This temperate region stretched from the dry forest-steppe zone in the west to greener forests in the east. By this time, agricultural society had already replaced the natural ecosystems of these

¹⁸This image was taken by a US spy satellite from the CORONA program sometime between 1960 and 1972. It was made available at <https://corona.cast.uark.edu> by the Center for Advanced Spatial Technologies, University of Arkansas and the US Geological Survey. The approximate coordinates are 34°25'08.7"N 108°28'21.5"E.

¹⁹James C. Scott, *Seeing like a State: How Certain Schemes to Improve the Human Condition Have Failed* (New Haven: Yale University Press, 1998), 2. Archaeologists have reconstructed the general layout of palaces, roads, and workshops in remaining sections of Qin's capital; Shaanxi sheng kaogu yanjiusuo 陕西省考古研究所, *Qin du Xianyang kaogu baogao* 秦都咸陽考古報告 (Beijing: Kexue, 2004).

²⁰From 350 to 210 BCE, I estimate that Qin expanded from an area of around 100,000 km² to having some form of administrative control over an area of at least 2,000,000 km², not including vast areas to the south where it exercised a loose military hegemony.

lowlands with farms.²¹ To the north stretched the vast steppes and deserts of Inner Asia, while dense subtropical forests blanketed the south. Qin's heartland lay in the forest-steppe zone and it had controlled the subtropical central Yangzi River valley for generations, so its officials already had experience administering a variety of ecological zones and subsistence methods, from sheep herding to rice farming.

By the time of the First Emperor, the Guanzhong Basin of modern Shaanxi province had been its capital region for centuries. Excavated documents have recently revealed that the empire was divided at this time into Old and New Territories, the former of which consisted of the areas Qin had controlled before its massive expansion of the 220s. The New Territories had been conquered quickly, and Qin's control over them was weak.²² The main administrative units across the empire were hundreds of counties, while military control was divided into around forty commanderies.²³ Qin's control centered on a network of fertile agricultural regions that were directly administered by county governments and their various bureaus, which included Public Works, Households, Granaries, and Finance.

Most maps of Qin's empire published in recent decades reflect the influence of twentieth century nationalist Chinese historical geographers who sought to project the modern Chinese nation into antiquity. Their maps inaccurately depict huge swaths of territory south of the Yangzi as Qin territory.²⁴ The only areas south of the Yangzi over which Qin had substantial administrative control were the modern provinces of Hunan and Zhejiang, where they had taken over the populations that had once been ruled by the states of Chu and Yue. Beyond that, Qin controlled only a network of routes to its commandery garrisons at the sites of the modern cities of Guangzhou and (probably) Fuzhou and as-yet unidentified sites in the modern provinces of Guangxi and Guizhou. Qin officials knew virtually nothing about the vast forested regions between these routes. The extent of the Qin Empire is best understood by looking at the locations of its commanderies, shown in [Map 1](#).²⁵

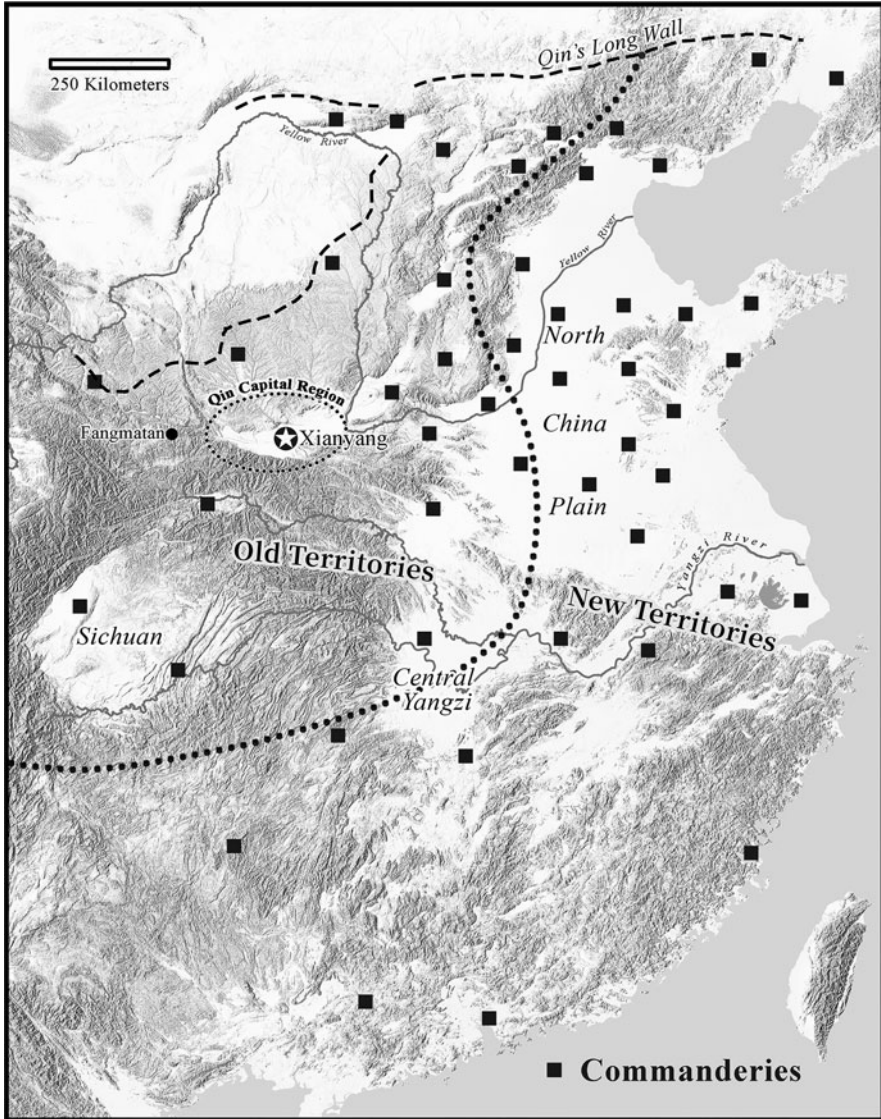
²¹On those ecosystems, see Brian Lander, "Birds and Beasts Were Many: The Ecology and Climate of the Guanzhong Basin in the Pre-Imperial Period," *Early China* 43 (2020), 207–45; Brian Lander and Katherine Brunson, "Wild Mammals of Ancient North China," *The Journal of Chinese History* 2.2 (2018), 291–312.

²²Jingrong Li, "The Governance of New Territories During the Qin Unification," *T'oung Pao* 108 (2022), 1–35.

²³The number of commanderies (*jun* 郡), counties (*xian* 縣), and districts (*xiang* 鄉) changed over time, and our knowledge of these changes remains limited. Hou Xiaorong 后晓荣, *Qin dai zhengqu dili* 秦代政區地理 (Beijing: Shehui kexue wenxian, 2009), 113–17.

²⁴Tan Qixiang 譚其驤, ed., *Zhongguo lishi dituji* 中國歷史地圖集, vol. 2 (Shanghai: Zhonghua dituxue she, 1975), 3–4; Yuri Pines with Lothar von Falkenhausen, Gideon Shelach, and Robin D.S. Yates, "General Introduction: Qin History Revisited," in *Birth of an Empire: The State of Qin Revisited*, ed. Yuri Pines, Lothar von Falkenhausen, Gideon Shelach, and Robin D.S. Yates (Berkeley: University of California Press, 2013), 19; Gideon Shelach-Lavi, *The Archaeology of Early China: From Prehistory to the Han Dynasty* (New York: Cambridge University Press, 2015), 309; Li Feng, *Early China: A Social and Cultural History* (Cambridge: Cambridge University Press, 2013), 247; Mark Edward Lewis, *The Early Chinese Empires: Qin and Han* (Cambridge: Belknap Press, 2007), 56. Lewis's map at least excludes Yunnan.

²⁵Locations of commanderies in [Map 1](#) based on Tan, *Zhongguo lishi dituji*, vol. 2, 3–4, and Maxim Korolkov, "Empire-Building and Market-Making at the Qin Frontier: Imperial Expansion and Economic Change, 221–207 BCE" (Ph.D. diss., Columbia University, 2020), 195. We do not know the locations of the two southwesternmost commanderies—Xiang 象 (elephant) and Guilin 桂林 (laurel forest)—but I have included them to show that Qin established garrisons in the region. Our information on them is



Map 1. The Qin Empire at its height. The New Territories, east and south of the dotted line, were those that Qin conquered between about 230 BCE and the collapse of the empire in 206 BCE. Based on Tan, *Zhongguo lishi dituji*, vol. 2, 3–12, and Korolkov, “Empire-Building,” 195. Base map by Lynn Carlson, GISP.

The biggest challenge for Qin was keeping control of the many millions of people in the lower Yellow River valley that it had rapidly conquered in the 220s, places where Qin had been feared for generations. If the First Emperor had not been a

vague and was written centuries after Qin’s fall; Hou, *Qin dai zhengqu dili*, 435–39. Thanks to Lynn Carlson for making the base map.

megalomaniac, he could have reduced taxes and labor service to convince the people of that region that Qin rule would benefit them. Instead, he kept conquering. To the south, Qin invaded all the way to the ocean. To the north, Qin attacked the pastoralists of the Ordos Plateau and built the Great Wall, prompting the people there to band together and form the world's first nomadic empire, the Xiongnu.²⁶ The brief rule of the Qin Empire established patterns that lasted for the next two millennia, most notably the rivalry between the empires of steppe and sown, and the gradual conquest and assimilation of the peoples of the region that is now South China, which was accompanied by the intensification of agriculture.

Knowledge is Power: The Circulation of Information in the Empire

Building an effective information network was particularly important for Qin because its income mostly consisted of grain grown across a huge area.²⁷ Apart from a few navigable waterways, there was no way to move grain or other bulk goods over long distances, so Qin officials had to control resources without bringing them to the capital. This is a problem shared by most terrestrial empires, but not by European overseas empires, and to a much lesser degree by the Roman Empire, which could ship bulk goods cheaply around the Mediterranean. In order to control distant resources, officials of Qin's central government built an administrative system that gathered information about the materials and labor at its command across the empire and directed local officials on how to employ them. Officials at the local level spent a lot of time collecting and synthesizing information and sending it to other officials. It was a very bureaucratic empire.

People and land were the basis of the whole political system, and the state kept careful track of them. The *Book of Lord Shang* emphasized this: "in registering the number of the people, record those who are born and erase those who die. When the people do not abscond from producing grain, fields will not be covered by wild grasses. Then the state is rich."²⁸ Every year each district was supposed to send records of family members and landholdings to the county office.²⁹ The household registers list the status, rank and name of each person, beginning with the (usually male) head of household followed by other adult males, their wives, other adults (parents, concubines, servants, or slaves; with slaves sometimes listed after children) and children, including whose children they were.³⁰ Recording children made it easier to keep track of future taxpayers, laborers and soldiers.

²⁶Owen Lattimore, *Inner Asian Frontiers of China*, 2nd ed. (Irving-on-Hudson: Capitol, 1951), 344–463; Honeychurch, *Inner Asia and the Spatial Politics of Empire*.

²⁷On the similarities between the Qin's information system and those of modern empires, see, e.g., James R. Akerman, ed., *The Imperial Map: Cartography and the Mastery of Empire* (Chicago: University of Chicago Press, 2009); Simon Franklin, *Information and Empire: Mechanisms of Communication in Russia, 1600–1850* (Cambridge: Open Book Publishers, 2017).

²⁸Jiang, *Shang jun shu zhuzhi*, 4.32; Pines, *The Book of Lord Shang*, 153. I have modified Pines's translation.

²⁹Barbieri-Low and Yates, *Law, State, and Society*, 799–817. Like most early Han laws, these were probably adopted from Qin.

³⁰Hsing Yi-tien, "Qin-Han Census and Tax and Corvée Administration: Notes on Newly Discovered Texts," in *Birth of an Empire: The State of Qin Revisited*, edited by Yuri Pines, Lothar von Falkenhausen, Gideon Shelach, and Robin D.S. Yates (Berkeley: University of California Press, 2013), 155–86; Charles Sanft, "Population Records from Liye: Ideology in Practice," in *Ideology of Power and*

A huge cache of administrative documents excavated from a well in the Qin border garrison in the town of Liye, Hunan, is particularly useful for understanding what kinds of information a Qin county office gathered.³¹ These documents include not only registers of various things, but even registers of these registers: officials made lists of the things that they made lists of. The Bureau of Households kept registers of household members, conscript labor, equipment, taxes, debt pledges, field embankments, and boundary markers, and the number of people who had been interrogated.³² The Bureau of Works kept registers of boats, tools, fines, and debts.³³ The Bureau of Granaries kept registers of grain, loans, livestock, animal feed, tools, cash, cattle, horses, and sheep.³⁴ The Bureau of Finance kept registers of lacquer, bamboo, ponds, chestnut orchards, mined iron, markets, cast metal, arrows, orchards, and work done in government workshops.³⁵ The goal of all this list-making was to keep track of the population and all taxable economic production and to make sure officials did not steal or neglect state property.

The government was especially concerned with harvests. Each year county officials had to inform higher levels of administration how many fields had been cleared for farming, along with the number of associated households.³⁶ When harvest time was approaching, Qin statutes also required local officials to promptly report detailed information on crops, including both good harvests and damaged crops.³⁷ These estimates were probably important for planning the season's warfare and public works, in addition to their main purpose of annually adjusting taxation rates.³⁸

Qin's system had been developed in a small region in which officials were never too far from the capital and could send information relatively easily, but this high level of administration was not appropriate for running an empire that stretched to the limits of the known world. The subsequent Han Empire opted for the much cheaper option of setting a fixed annual tax for each field. This reduced the amount of tax collected by the central government but also reduced the cost of administration. It also left some surplus for local elites, providing them with an incentive to support the empire, something the Qin system had failed to do.³⁹

Power of Ideology in Early China, edited by Yuri Pines, Paul R. Goldin, and Martin Kern (Leiden: Brill, 2015), 249–69.

³¹Robin D.S. Yates, "The Qin Slips and Boards from Well No. 1, Liye, Hunan: A Brief Introduction to the Qin Qianling County Archives," *Early China* 35 (2012), 291–329; Korolkov, "Empire-Building."

³²Hunan sheng wenwu kaogu yanjiusuo 湖南省文物考古研究所, *Liye Qin jian* 里耶秦簡, vol. 1 (Beijing: Wenwu, 2012), 73.8–488.

³³1:1:71.8–480.

³⁴Liye vol. 1, 1:72.8–481; Chen Wei 陳偉 et al., *Liye Qin jian du jiaoshi* 里耶秦簡牘校釋, vol. 1 (Wuhan: Wuhan daxue, 2012), 164.

³⁵*Liye Qin jian*, 1:67.8–454.

³⁶As for fields that have already been cleared, send up (to higher authorities) their numbers, attached to the number of households." Hunan sheng wenwu kaogu yanjiusuo 湖南省文物考古研究所, *Liye Qin jian* 里耶秦簡, vol. 2 (Beijing: Wenwu, 2018), 20, 7. Slip 9.40; Barbieri-Low and Yates, *Law, State, and Society*, 223.

³⁷Shuihudi Qin mu zhujian zhengli xiaozu 睡虎地秦墓竹簡整理小組, *Shuihudi Qin mu zhujian* 睡虎地秦墓竹簡 (Beijing: Wenwu, 1990), 15.1–3; Hulsewé, *Remnants of Ch'in Law*, 21; Robin D.S. Yates, "Some Notes on Ch'in Law: A Review Article of Remnants of Ch'in Law by A.F.P. Hulsewé," *Early China* 11 (1985), 247.

³⁸Yang Zhenhong 楊振紅, "Longgang Qin jian zhu 'tian,' 'zu' jian shiyi buzheng" 龍崗秦簡諸'田'、'租'簡釋義補正, *Jianbo yanjiu* 簡帛研究 2004: 79–98.

³⁹A point made in Korolkov, "Empire-Building and Market-Making."

Muscles and Sweat: Grain Taxes and the Labor of Mammals

The empire's power was based on its ability to deploy huge amounts of unpaid labor for both military and civil projects.⁴⁰ Humans did most of the physical labor, though horses and cattle also worked on state projects. All of this labor was powered by foodstuffs paid in taxes and by pasture. Each household had to pay taxes, usually in foods like millets or beans, but also in hemp and local specialty products. There was also a hay and straw tax that was sometime paid in coins. Qin maintained granaries across the empire whose main purpose was to stock these materials and then distribute them to military and civilian laborers. They probably also lent farmers seed grain if they needed it, and presumably fed people in times of famine.⁴¹

Just as humans had tamed wild animals and turned them into beasts of burden, the transition from small, relatively egalitarian societies into highly stratified states required turning the population into laborers for elites.⁴² As in the other end of Eurasia, where phrases like “the lord is my shepherd” encapsulated existing social relations, people in early China compared the relationship between elites and commoners to that between herders and their animals, a good example being the famous work of early political theory titled “Herding the People.”⁴³ Qin administrative documents similarly make clear that the state saw little difference between convict laborers and livestock, as shown in this document listing the things an inspector had inspected at a Bureau of Granaries:⁴⁴

Inspection of the offspring of the Office of Livestock's pigs and dogs.
 Inspection of the Office of Livestock's pigs and dogs that died or escaped.
 Inspection of the laborer-servants who died or escaped.
 Inspection of the offspring produced by laborer-servants.
 Inspection of cash produced in workshops.
 Inspection of the Office of Livestock's geese that died or escaped.
 Inspection of the offspring of the Office of Livestock's geese.
 Total: [writing unclear].

Granary officials spent much of their time distributing grain to laborers and livestock. The amount of grain they gave to each person depended on their sex, age, and status. All adult males were legally required to do both military service and statute labor except those who held higher ranks or were disabled. Most grain was used to feed these commoners doing routine military or statute labor service, but Qin also exploited the labor

⁴⁰Korolkov, “Empire-Building”; A.F.P. Hulswé, “Some Remarks on Statute Labour during the Ch'in and Han Period,” in *Orientalia Veneziana* 1 (1984), 195–204; Lander, *The King's Harvest*, chap. 5.

⁴¹There is no direct evidence of Qin feeding people in times of famine, but given the state's granary network and the importance of population growth to rulers of the period, there is little doubt that they did. Hulswé, *Remnants of Ch'in Law*, 41–42; Robin D.S. Yates, “War, Food Shortages, and Relief Measures in Early China,” in *Hunger in History: Food Shortage, Poverty, and Deprivation*, edited by Lucile F. Newman (New York: Blackwell, 1990), 147–88.

⁴²Guillermo Algaze, *Ancient Mesopotamia at the Dawn of Civilization: The Evolution of an Urban Landscape* (Chicago: University of Chicago Press, 2008), 129; James Scott, *Against the Grain: A Deep History of the Earliest States* (New Haven: Yale University Press, 2017).

⁴³W. Allyn Rickett, *Guanzi: Political, Economic and Philosophical Essays from Early China: A Study and Translation*, vol. 1 (Princeton: Princeton University Press, 1985), 51–57.

⁴⁴Chen, *Liye Qin jian du jiaoshi* 1, 1:169 (document 8.495).

of many convicts and debtors.⁴⁵ Not only did Qin's judicial system sentence many law-breakers to hard labor sentences of various kinds, it often commuted traditional mutilating punishments to large fines which all but the wealthy had to pay off by working for the state. Sentences of castration and amputation of a foot were commuted to a fine of 12,500 coins, while nose amputation was commuted to 10,000 coins. Workers were paid only eight coins for a day of work.⁴⁶

Qin had a standardized system of quantifying labor into units which involved grading different types of laborers and different types of work. This standardized system allowed the administration to treat laborers as interchangeable units, giving it great flexibility in how it exploited them. Qin also established standards for exchanging grain, beans, coins, cloth, and other commodities with one another. By establishing a standardized exchange system across the empire, Qin's control greatly facilitated the spread of commerce, though this was only beginning by the time Qin collapsed. The benefits to commerce created by a subcontinent-wide governance system were only fully realized under the Han.⁴⁷

Qin used all the labor at its disposal to reorganize landscapes and hydrological systems across the empire, often to expand or improve arable land. The most common labor projects were routine activities like digging ditches, canals and irrigation works, constructing roads, dikes, walls, and buildings, and maintaining all of these. Qin maintained a series of roads across the empire to facilitate the movement of armies, the postal service, and other personnel.⁴⁸ Most of this network probably existed before Qin, but maintaining it was a regular responsibility of local officials, and probably a main *corvée* task. Qin also maintained a network of water transportation routes of which very little is known. Qin had the Ling Canal built to link the Yangzi and Pearl River valleys, probably to facilitate its invasion of the far south. Along with existing canals that linked the Yellow and Yangzi Rivers, the Ling Canal theoretically made it possible to ship goods on inland waterways from the Yellow River all the way to the South China sea.⁴⁹ The only commodities valuable enough to ship such a long distance were exotic animal products like elephant tusks, bird feathers, and rhinoceros horns.

In lowland areas the state built and maintained dikes to protect and expand arable land. Like the highway system and irrigation projects, the construction of large river dikes on the Yellow and Yangzi rivers is a classic example of the type of project that could only be achieved by a powerful state. Most of our evidence on early river dikes comes from Qin's Warring States rivals, or from the subsequent Han period, but we know that dikes were common in Qin because maintaining them was a regular duty

⁴⁵ Barbieri-Low and Yates, *Law, State, and Society*, 187–219, LXVIII, 834–35; *Shuihudi Qin mu zhujian*, 19.49–50; Hulsewé, *Remnants of Ch'in Law*, 31.

⁴⁶ *Shuihudi Qin mu zhujian*, 26.136; Hulsewé, *Remnants of Ch'in Law*, 67.

⁴⁷ Korolkov, "Labor and Value in the Qin Empire"; Karine Chemla and Shuchun Guo, *Les neuf chapitres: le classique mathématique de la Chine ancienne et ses commentaires* (Paris: Dunod, 2004), 201–61; Joseph W. Dauben, "Suan Shu Shu: A Book on Numbers and Computations; English Translation with Commentary," *Archive for the History of Exact Sciences* 62 (2008), 91–178; Hulsewé, *Remnants of Ch'in Law*, 42, 163.

⁴⁸ For a map of these roads, see Lewis, *The Early Chinese Empires*, 56; See also Y. Edmund Lien, "Reconstructing the Postal Relay System of the Han Period," in *A History of Chinese Letters and Epistolary Culture*, edited by Antje Richter (Leiden: Brill, 2015), 15–52.

⁴⁹ On the canal between the Yellow and Yangzi rivers, see Shi Nianhai 史念海, "Lun Jishui he Honggou" 論濟水和鴻溝, in *He shan ji* 河山集, vol. 3 (Beijing: Renmin, 1988), 303–56.

of Qin officials. A statute on water control has been excavated from two different early Han tombs, and since most of the early Han legal corpus was adopted from Qin there is a good chance that a version of this law existed in Qin.⁵⁰ Another piece of evidence on Qin dikes comes from fragmentary administrative documents written in the first century of Han rule on repairing dikes in the central Yangzi basin. These dikes were probably damaged or abandoned during the wars at the end of Qin rule.⁵¹ Dikes were built to replace seasonally flooded environments—including biodiverse wetlands—with taxable farmland.⁵²

Most labor was probably used on these routine infrastructure works, and they had the greatest effect on the environment, but Qin is best known for its megaprojects, which epitomized its ability to concentrate massive numbers of laborers at the whim of the emperor. Qin's two large-scale irrigation projects are classic examples of states transforming the environment for political power.⁵³ The Zheng Guo dam and canal project, completed in 246 BCE, irrigated the previously saline region east of the Qin capital at Xianyang. By turning a previously unproductive area in Qin's heartland into a reliable irrigated agricultural area, this project gave Qin a significant boost against its rivals. The Dujiangyan irrigation project in Sichuan was a classic colonial infrastructure project. Built after Qin conquered the region in the late fourth century BCE, this project helped destroy the unique civilization of Sichuan and replace it with an agricultural colony whose surpluses fueled further Qin conquests. Qin moved tens of thousands of households into conquered regions, which served both to develop those regions and to break down the solidarity of conquered peoples.⁵⁴

Qin's Long Wall—the first Great Wall of China—is perhaps the most (in)famous of Qin's megaprojects, and probably the most environmentally significant. Others included the First Emperor's mausoleum, of which the terracotta army is just one part, and various palaces. The *Historical Records* reports that 700,000 convicts were assigned to build the mausoleum and the Epang Palace, both in the Guanzhong Basin.⁵⁵ This figure is quite plausible given that the rammed earth foundations of the

⁵⁰Brian Lander, "Small Scale Water Control Works in Early China," forthcoming in *Water History* (2022).

⁵¹Brian Lander, "State Management of River Dikes in Early China: New Sources on the Environmental History of the Central Yangzi Region," *T'oung Pao* 100.4–5 (2014), 325–62.

⁵²Brian Lander, "From Wetland to Farmland: How Humans Transformed the Central Yangzi Basin," *Asia Major* 35.1 (2022), 1–31.

⁵³Joseph Needham, Ling Wang, and Gwei-djen Lu, *Science and Civilisation in China 4.3: Civil Engineering and Nautics* (Cambridge: Cambridge University Press, 1971), 285–96; Lander, *The King's Harvest*, 146–52.

⁵⁴Anthony J. Barbieri-Low, "Coerced Migration and Resettlement in the Qin Imperial Expansion," *Journal of Chinese History* 5 (2021), 181–202; Gary Feinman, Linda Nicholas, and Fang Hui, "The Imprint of China's First Emperor on the Distant Realm of Eastern Shandong," *Proceedings of the National Academy of Sciences* 107.11 (2010), 4851–4856; Sima, *Shi ji*, 6.244–259; William H. Nienhauser, ed., *The Grand Scribe's Records 1: The Basic Annals of Pre-Han China*, 2nd ed. (Bloomington: Indiana University Press and Nanjing: Nanjing University Press, 2018), 257–73. Qin's irrigation project in Sichuan may have been an expansion of the system already in use by the kingdom of Shu, not a Qin innovation, but only archaeology can prove this.

⁵⁵*Yin gong* 隱宮 here is probably an error for *yin guan* 隱官, which refers to prisoners who have suffered mutilating punishments but were then manumitted to some degree. Michael Loewe, "On the Terms Bao Zi, Yin Gong, Yin Guan, Huan, and Shou; Was Zhao Gao a Eunuch?," *T'oung Pao* 91.4/5 (2005), 308–17; Sima, *Shi ji*, 6.256; Nienhauser, *The Grand Scribe's Records 1* (2nd ed.), 270.

unfinished Epang palace still measure 1,270 x 426 meters.⁵⁶ The First Emperor's mausoleum complex covers an area of over fifty square kilometers, making it by far the largest tomb ever built in China, and "probably the largest burial complex of a single ruler ever to have been constructed anywhere in the world."⁵⁷ Those who had lived through the fall of Qin considered these megaprojects to have been a major cause of the uprisings that toppled Qin because they were blatantly exploitative, and turned the people against the state. Sima Qian wrote "In my travels I saw the Long Wall and fortifications that Meng Tian built for Qin, cutting through mountains and filling up valleys to open up the Straight Road. He indeed treated the people's labor lightly."⁵⁸

In addition to the labor of humans, Qin also employed that of domesticated cattle and horses—large, hooved mammals whose power is easy for those of us living in the age of internal combustion engines to underestimate. Qin's core territory included vast areas of grazing land, and its abundance of cattle and horses gave it an advantage over its rivals in the more densely populated central Yellow River valley. Cattle were kept for ploughing and pulling carts. Government storehouses were allowed to lend their cattle and vehicles to common people for their private use, but the lender was responsible for the condition of the cattle.⁵⁹ Oxen were regularly evaluated and their keepers rewarded or punished depending on their health.⁶⁰ People were required to pay straw and hay taxes to provide feed for carriage horses and draft oxen, which officials then distributed to the animals based on their age and what kind of work they did.⁶¹ Cows were given grain rations for fifteen days after giving birth.⁶² Hard working horses, such as those of the courier service, were also fed grain and beans.

In contrast to cattle, which were valuable but not prestigious, horses were symbols of wealth and power. They were used for warfare, carrying messengers, and for pulling chariots and carriages. There were at least twenty-one different officials in charge of stables and horses in Qin palaces.⁶³ In the pastoral areas of the north there were large herds of cattle, horses, sheep, and goats, which Sima Qian cited as being among the great stores of wealth in the Han Empire.⁶⁴ Qin must have had some way to tax these but, unfortunately, we have no sources from that region. Tombs of nomadic pastoralists have also been discovered within Qin territory. We do not know if they paid tax or tribute, but we do know that Qin had regular trade relations with them for centuries, and their knowledge of horseback warfare probably contributed to the power of the Qin military.⁶⁵

⁵⁶Charles Sanft, "The Construction and Deconstruction of Epanggong: Notes from the Crossroads of History and Poetry," *Oriens Extremus* 47 (2008), 160–76.

⁵⁷Shelach, "Collapse or Transformation," 129.

⁵⁸Sima, *Shi ji*, 88.2570; Nienhauser, *Grand Scribe's Records* 7, 367. Translation modified to reflect *qing's* 輕 meaning "to treat lightly, consider of scant importance."

⁵⁹*Shuihudi Qin mu zhujian*, 25.126–27; Hulsewé, *Remnants of Ch'in Law*, 74.

⁶⁰*Shuihudi Qin mu zhujian*, 16.13–20, 17.31; Hulsewé, *Remnants of Ch'in Law*, 26–28, 115.

⁶¹Barbieri-Low and Yates, *Law, State, and Society*, 920–23; Korolkov, "Empire-Building," 107–11; Peng Hao 彭浩, *Zhangjiashan Han jian "Suan shu shu" zhushi* 張家山漢簡"算數書"注釋 (Beijing: Kexue, 2001), 62.53–54; Dauben, "Suan Shu Shu," 126–27.

⁶²*Shuihudi Qin mu zhujian*, 18.47, 21.74; Hulsewé, *Remnants of Ch'in Law*, 30, 47; Barbieri-Low and Yates, *Law, State, and Society*, 922–23.

⁶³Zhou Xiaolu 周曉陸 and Lu Dongzhi 路東之, *Qin fengni ji* 秦封泥集 (Xi'an: San Qin, 2000), 183–98.

⁶⁴Sima, *Shi ji*, 128.3254, 3262; Burton Watson, *Records of the Grand Historian: Han Dynasty Vol. 2* (Hong Kong: Renditions-Columbia University Press, 1993), 434, 441.

⁶⁵Yang Liu, ed., *Beyond The First Emperor's Mausoleum: New Perspectives on Qin Art* (Minneapolis: The Minneapolis Institute of Arts, 2014), 193–236; Katherine Linduff, "Production of Signature Artifacts for the Nomad Market in the State of Qin during the Late Warring States Period in China (4th–3rd Century

While cattle and horses were the animals of most interest to the state, commoners were more likely to own pigs, dogs, and chickens. These are rarely mentioned in our sources, and it seems that Qin did not tax them. Government offices also raised pigs, dogs, geese, and chickens to feed their employees.⁶⁶ The state also collected exotic animals, or parts of them, from across the empire, including feathers for arrows and special fish for the imperial palace. And a record from Liye reveals that Qin awarded people exemptions from taxation for people who killed a tiger.⁶⁷ Tigers hunt both people and livestock, so it is not surprising that the state encouraged its subjects to kill them. Tigers are native to virtually all of China proper, but there are no wild tigers left in China.

Wood and Metal: State Control over Forests and Mines

The empire required plenty of raw materials, especially timber and minerals. The central government directly operated mines in key areas, had offices in charge of iron production, and also collected taxes from private producers of salt and iron. The main metals in this period were iron/steel and bronze (an alloy of copper, tin, and lead). China's iron works were among the most advanced in the world in terms of both technology and organization, but there is no solid evidence that any of the Warring States were more advanced in metallurgy than their rivals by the time of Qin's conquests. Iron tools were just beginning to be widely produced at this time.⁶⁸ Iron ore is widely available, but we know little about where Qin got its other metals. There were sources of copper, tin, and lead in the north, but more in the south, and Qin's conquest of the Central Yangzi in the 270s BCE gave it control over a key copper producing region.⁶⁹ Qin encouraged private entrepreneurs to produce metals in conquered territories like Sichuan.⁷⁰ Qin also had mines worked by convict and statute laborers.⁷¹ State control of iron and salt has traditionally been considered an innovation of the Han Empire, but excavated documents and seal impressions reveal that it originated with Qin.⁷² Wood was the fuel for producing metal and ceramics, and kilns and smelting sites were often located near forests. Qin also had workshops in its capital at Xianyang.

The most detailed information we have on Qin's exploitation of timber resources comes from seven maps excavated from the tomb of a Qin official that was discovered at a modern logging camp at Fangmatan, in the mountains west of the Qin capital

BCE),” in *Metallurgy and Civilisation: Eurasia and Beyond*, ed. Jianjun Mei and Thilo Rehren (London: Archetype, 2009), 90–96; Honeychurch, *Inner Asia and the Spatial Politics of Empire*. Qin was not the only Warring State that enjoyed the advantages of having extensive grazing land and contacts with pastoralists; Zhao and Yan were in a similar position.

⁶⁶Shuihudi Qin mu zhujian, 20.63; Hulswé, *Remnants of Ch' in Law*, 45.

⁶⁷Liye Qin jian, 1:8.170.

⁶⁸Liu Xinglin 劉興林, *Xian Qin liang Han nongye yu xiangcun juluo de kaoguxue yanjiu* 先秦兩漢農業與鄉村聚落的考古學研究 (Beijing: Wenwu, 2017), 33–39; Donald B. Wagner, *Science and Civilisation in China 5.11: Ferrous Metallurgy* (Cambridge: Cambridge University Press, 2008), 83–114.

⁶⁹Peter J. Golas, *Science and Civilisation in China 5.13: Mining* (Cambridge: Cambridge University Press, 1999), 72–109.

⁷⁰Wagner, *Science and Civilisation in China 5.11*, 140–44.

⁷¹Korolkov, “Empire-Building,” 278–79. He cites *Liye Qin jian bowuguan cang Qin jian*, 57 and 65, tablets 12-3, 12-447, and 14-469.

⁷²Korolkov, 66, 125, 277, 490, 601; Barbieri-Low and Yates, *Law, State, and Society*, 1251–54.

(indicated on Map 1).⁷³ This area's timber was convenient because it could be floated down the Wei River to the capital.⁷⁴ These maps were made by the state to survey forest resources, either because Qin officials were overseeing logging operations or because they were regulating and taxing private loggers.⁷⁵ They are the only ancient resource maps discovered from ancient China, but contemporary writings make clear that maps were widely used by administrators. Given the size of the Qin state and its building projects, it must have needed a lot of timber, and these maps reveal where Qin obtained some of it. This is a chance discovery of a resource extraction operation that probably had parallels throughout the empire. Qin also imported high quality timber from the Yangzi valley to build palaces.⁷⁶

Qin obtained its timber in the mountains far from population centers because most large straight trees had already been cut from forests closer to home.⁷⁷ Contemporary political theorists complained about the overexploitation of resources, and argued that regulating resource use was the job of the ruler.⁷⁸ These ideas were eventually incorporated into Qin's statutes, which included seasonal bans on activities like cutting timber, blocking water courses, burning vegetation, collecting young animals or eggs, and various activities related to fishing and hunting.⁷⁹ Statutes related to hunting in royal parks were excavated from a tomb at the Yunmeng park in the central Yangzi region, which was well known for its abundant wildlife. The statutes assert that poachers caught hunting boar and deer in the park should be sentenced to hard labor, while those caught with dhole, wolf, raccoon-dog, porcupine, fox, pheasant, and rabbit should not be punished.⁸⁰ In other words, commoners could hunt small animals for their pelts, but larger animals were reserved for elites to hunt and eat.

⁷³Chen Wei 陳偉, Sun Zhanyu 孫占宇, and Yan Changgui 晏昌貴, *Qin jiandu heji (si) : Fangmatan Qin mu jiandu 秦簡牘合集(肆): 放馬灘秦墓簡牘* (Wuhan: Wuhan Daxue, 2014); Yan Changgui 晏昌貴, "Tianshui Fangmatan muban ditu xintan" 天水放馬談木板地圖新探, *Kaogu xuebao* 3 (2016), 365–84; Mei-Ling Hsu, "The Qin Maps: A Clue to Later Chinese Cartographic Development," *Imago Mundi* 45 (1993), 90–100.

⁷⁴Shi Nianhai 史念海, *Huangtu Gaoyuan lishi dili yanjiu 黃土高原歷史地理研究* (Zhengzhou: Huang He shuili, 2001), 125, 149–50; Wang Xianqian 王先謙, *Han shu buzhu 漢書補注* (Shanghai: Shanghai guji, 2012), 28.2824.

⁷⁵The maps were made sometime between 300 and 239 BCE: Wang Zijin 王子今 and Li Si 李斯, "Fangmatan Qin ditu linye jiaotong shiliao yanjiu" 放馬灘秦地圖林業交通史料研究, *Zhongguo lishi dili luncong* 28.2 (2013), 5.

⁷⁶Sima, *Shi ji*, 6.256; Nienhauser, *The Grand Scribe's Records 1* (2nd ed.), 270.

⁷⁷A recurring theme in the *Zhuangzi* is that the best way for a tree to live a long life was to make sure its wood was useless: Guo Qingfan 郭慶藩, *Zhuangzi jishi 莊子集釋* (Beijing: Zhonghua, 1961), 1.39–40, 4.170–77, 20.667, 680.

⁷⁸John Knoblock and Jeffrey Riegel, *The Annals of Lü Buwei: A Complete Translation and Study* (Stanford: Stanford University Press, 2000), 63, 97, 134, 155, 248, 642, 653; John Knoblock, *Xunzi: A Translation and Study of the Complete Works* (Stanford: Stanford University Press, 1988), 9.105; James Legge, *The Chinese Classics II: The Works of Mencius* (Taipei: SMC, 1991), 107; Ian M. Miller, "Forestry and the Politics of Sustainability in Early China," *Environmental History* 22 (2017), 594–617.

⁷⁹Shuihudi *Qin mu zhujian*, 2.3–6; Hulsewé, *Remnants of Ch'in in Law*, 22; Barbieri-Low and Yates, *Law, State, and Society*, 698–713; Charles Sanft, "Environment and Law in Early Imperial China (Third Century BCE–First Century CE): Qin and Han Statutes Concerning Natural Resources," *Environmental History* 15.4 (2010), 701–21.

⁸⁰Liang Zhu 梁柱 and Liu Xinfang 劉信芳, *Yunmeng Longgang Qin jian 雲夢龍崗秦簡* (Beijing: Kexue, 1997), slips 278, 279, 258 and 254.

Smaller-scale societies often have customs for protecting resources, such as taboos on harvesting specific species, or seasonal regulations. I suspect that by taking control of communal resources Qin replaced many of these customs with legal restrictions on their use. By making wild resources state property, Qin weakened cultural traditions of sustainable resources use and instead made such resources into forbidden goods, which would encourage people to think of them as something they should exploit whenever the chance arose. We have few sources on the moral economy of commoners in this period, but objections of Confucian thinkers to the state takeover of communal resources suggests that there was probably resistance to, or at least non-compliance with, laws against hunting, wood cutting, and foraging in forests.⁸¹

Conclusion

The empire seemed solid when the First Emperor died in 210 BCE, but it quickly collapsed. Analyzing Qin's fall a generation later, Jia Yi believed that the empire would have survived if the Second Emperor had only corrected the harshest aspects of his father's rule. He argued that convicts and their families should have been released from labor camps and freed from mutilating punishments (which, as we have seen, were often effectively labor sentences), thereby freeing large number of people to return to their villages. The passage concludes by saying that if the second Qin emperor had "opened granaries and distributed wealth to relieve the orphaned, the childless, the poor and the destitute, lightened taxation and reduced labor projects to assist the people in need, simplified laws and lessened punishments to put people on probation" then people would have been able to live with Qin rule and would not have taken the risk of rebelling and overthrowing it.⁸² This matches with the picture described above, in which Qin officials worked hard to take maximum advantage of people's labor by levying high taxes and finding various ways to make them work for the state. Despite this, it is worth emphasizing that the Qin Empire was only unsustainable in a political sense, not in an ecological one. The environmental consequences of the Qin Empire lie mostly in its legacy, the centralized bureaucratic political model.

The Qin Empire collapsed rapidly but the Han Empire rebuilt its administration, reconquered its territory and gradually established a strong grip over regions Qin had only barely controlled. The Han then expanded even further and played a substantial role in domesticating the landscapes of the Yangzi River valley and regions further south. Early Han administrators, many of whom had previously been Qin officials, decided to fix tax rates at lower levels, thereby reducing the cost of governing while leaving more of the surplus from the local economies to be taken by local elites. This alliance between central and local power structures relinquished some of the central control of Qin's system but made the system more politically sustainable. While Qin-style command economies have been resurrected several times in Chinese history (most recently in the 1950s), the early Han model of low central government taxation was a key modification of Qin's system innovation and awareness of the dangers of excessive taxation allowed the imperial system to endure for two millennia.⁸³

Because of the writings of Han scholar-officials like Jia Yi and Sima Qian, Qin became the paradigmatic lesson of why governments should not tax too much.

⁸¹Legge, *Mencius*, 153 (1B).

⁸²Sima, *Shi ji*, 6.284; Nienhauser, *The Grand Scribe's Records 1* (2nd ed.), 298.

⁸³This paragraph based on Korolkov, "Empire-Building," chap. 7.

Nonetheless, the long reign of the Han Empire established Qin's centralized bureaucracy as the paradigm of political organization in China. Qin's successors tended to have much weaker control at the local level than Qin did, but their general political model remained centralized bureaucracy. Even foreign rulers with very different political ideals, such as the Mongols and Manchus, ended up ruling China with versions of Chinese governance methods. From the point of view of comparative politics, Qin's model has thus been among the most successful innovations in human history. But because these agrarian empires encouraged the expansion of taxable farmland and the growth of the taxpaying population for over two millennia, their success helped create China's environmental crisis. They conquered more and more land and encouraged the spread of farmers into it, replacing diverse ecosystems with simplified agrarian ones. Their granary systems buffered populations against famines, and they mobilized the labor of their subjects to reshape landscapes and waterscapes across the subcontinent. And their administrative methods were also adopted by surrounding states.⁸⁴

While the role of states in transforming global environments has been widely recognized, environmental historians have rarely taken specific forms of political organization themselves as a focus of research. Yet such research agendas now have an urgent relevance. All states, ancient and modern, have depended on transforming environments to produce taxable surpluses, which inevitably increases human impact on the environment. But this does not mean that less government would be good for the environment, because reduced central government control simply unleashes a similar dynamic among other powerful groups in society. Building a sustainable future for our planet will require us to create better political systems, and with this goal in mind, there is much work to be done in rethinking human political history from an ecological perspective. Because of its highly organized and ambitious policies of resource extraction and control, the Qin dynasty and its long legacy of impact on governmental forms and environmental conditions in East Asia provide us with a rich and disquieting case study.

Competing interests. The author declares none.

⁸⁴Charles Holcombe, *The Genesis of East Asia, 221 B.C.–A.D. 907* (Honolulu: Association for Asian Studies, 2001); Lander, *The King's Harvest*, chap. 6.