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“Calamities of mining” (矿害) in Ming and Qing writings: Environmental and moral concerns

(明清文献中的“矿害”：环境意识和儒家社会道德观念)

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Introduction

This paper was proposed with the intention of analysing and comparing attitudes to mining and environmental problems associated with this activity in elite writing, government reports, and oral histories. It turned out not to be feasible in the intended form. The two groups of sources, elite writings and government records on the one hand, and oral histories on the other, look at mining from two perspectives that are so far apart that they appear to be talking about different phenomena.

For this reason, this paper begins by separately presenting the two perspectives. To proceed chronologically, the first begins by an overview of records in written sources of the Ming and Qing period. The second presents oral histories, with a few records dating to the late Qing, some to the period after 1950, and some collected in fieldwork in Yunnan by Yang Yuda and myself between 2011 and 2016. For a manageable geographic and environmental focus, the specific quotes used for this presentation refer to silver mines Yunnan. The final discussion analyses the different topics as expressions of different mentalities and different perspectives on the environment.

1.1 Ming and Qing written sources: The social environment

In the traditional body of sources on the Ming and Qing periods, such as the veritable records (實錄), essays on statecraft (經世文), and private notes (筆記) mining for coal, metals and other minerals is rarely touched upon, and when writers mention the topic, it is mostly to deplore problems. A systematic search for keywords related to mining (礦、洞、場、冶) in the veritable records produces only some 500 entries, with under 100 entries dating to the Ming. Around 80% of these focus on social problems caused by mines.

These were caused by the miners (礦徒, a term with negative connotations that implies unlawfulness), perceived as vagrants who would turn to banditry when given a chance or when the mines were exhausted, caused problems of social unrest to the surrounding villages, and caused problems of grain deficiency as large groups who had left agriculture.

A typical entry in the records, dating to the Jiajing period (1507-1567) reads:

福建巡按御史白賁言：建寧境內故有坑礦數處，浙江溫處，礦徒流聚其中，盜鑄而居，民為之接濟藏匿以故充斥山谷有司不能制。

It records the anger of the Fujian intendant about problems caused by groups of miners (礦徒, a term with negative connotations that implies unlawfulness) who took over small mines, cast illicit cash coins, and were protected by the surrounding villages.

In other words, administrators were overwhelmingly concerned with social effects of mining. They perceived the activity as dangerous because it involved groups of uprooted men that could become bandits or insurgents, and because it had a damaging influence on local morals and customs, luring peasants from their fields in search of quick monetary gains.

Another set of problems was raised from the late Ming, which also concerned local societies but were caused by the administration, especially of silver mines. Taxation had gradually become a quota system that was set for the administrative area in which the mine was located and had become disassociated with the actual sites of exploitation and their productivity. As a result, when outputs fell or ceased, the entire population of the district was made to pay high surcharges to raise the mining tax.

A few writers brought up other issues, including environmental concerns.

In 1597 Yao Enren 姚思仁¹, first minister (zaixiang) of the Wanli emperor, submitted a memorial that enumerated eight aspects of concern in silver mining:

中原八郡，實天下樞機，臣自入境以，來巡行郡邑，問民病苦，其開礦之大可慮者。有八礦盜嘯聚召，亂可慮，一也。礦頭累極土崩，可慮二也。礦夫殘害流亡，可慮三也。雇民糧缺噪呼，可慮四也。礦洞徧開浪費，可慮五也。礦砂銀少逼買，可慮六也。民皆開礦失業，可慮七也。奏官強橫激變，可慮八也。今礦頭以賠累死，平民以逼買死，礦夫以傾壓死、以爭鬪死，自初開至今，已踰八月，而所解不過四千。及今不止恐禍起蕭牆變生肘腋雖傾府庫之藏竭天下之力亦無濟於存亡矣。

The first and foremost was unrest, the second were landslides, the third were injuries, deaths and vagrancy of miners, the fourth grain deficiency because of a too high proportion of people in an area hired for work, the fifth the waste of capital in opening too many mines, the sixth low silver contents in the ore, the seventh that people left agriculture and eventually lost their fields because they turned to mining, and the eighth were abuses by officials that caused insurrections.

The single purely environmental problem that Yao included were landslides or smaller movements of waste products of mines. The other problems were social and administrative, although the health risks in underground mining are indirectly addressed (殘 could cover accidents as well as other bodily harm, such as lung conditions that were frequent in pre-modern mining due to stone dust, gas and poor ventilation).

Qing writings are overall similar in the overwhelming focus on miners as a source of unrest and on the “pollution” of local morals.

Ni Tui 倪蜕 (1668-1748), a painter and scholar who spent his life in Kunming, records problems of mines and the mining administration of the Ming in his chronology of Yunnan. He singles out a single official for praise. Chen Cha, who served as provincial judge in the early sixteenth century resolutely opposed a proposal to increase taxes of silver mines in the province in order to raise funds for the troops. He argued:

『此兵之端、食之囊也。人睹其利，我睹其害。夫矿开则人聚，人聚则食广。云南有限之谷，其能饲此不耕之人乎！谷细则民馁，民馁则甘盗。度支之费未佐，军事之供益迫矣。独平见括苍之已事乎，』遂罢议。

(滇雲歷年傳 (A chronology of Yunnan). Orig. 1846. Interpunctuated ed. by Li Yan 李埏. Kunming: Yunnan daxue chubanshe, 1992, 359, referring to 1511. The proposal was rejected.)

The key phrase is: “They see profit, I see disaster. When mines are opened, people congregate, and where people congregate, they consume food grown in a large area. But

¹ 字善长。浙江秀水（今嘉兴）人。明代宰相。

姚思仁初时授行人，后升任御史等职。不久巡按河南。天启二年（1622），姚思仁官至工部尚书，位居宰相之职。次年以才老致仕。姚思仁去世时年九十一岁。

Yunnan has only limited grain, how can it feed these people who do not till the land! When grain is scarce, people will go hungry, and when people go hungry, they will be prepared to turn to banditry. While the provincial expenses will not have received any support, there will be a military emergency to cover.”

The argument involves the environment but it is environmental in the Confucian agriculturalism (農本). It employs the direct linear causality between the necessity of having almost all subjects of the empire working the land as peasants and food security and the fact that professional miners are not peasants and hence burden the region as “unproductive consumers.” The concern is not irrational, as Yunnan in fact has very limited arable land and a low population density. On the other hand, there are no indicators of a structural subsistence crisis in the province. The logic to the argument is immanent to agriculturalism rather than empirical.

An early eighteenth century document replicates the concern:

粵東開採一事，言之者甚眾，朕殊不以為然。蓋緣粵省不比滇黔，一者民俗善盜，二者米谷不敷，開採雖獲礦砂之利，然寒不堪衣，飢不堪食，而聚集數十萬不耕之人于荒山窮谷之中，其害不獨有誤農業而已也。縱云窮黎糊口資藉，終非養民之上策。硃據金鐵亦有開礦之請，尚未議定，俟試行后再降諭旨。

(《朱批諭旨》;第4函，第19冊，頁10，王士俊》，quoted in Qingdai de kuangye, 28)

The concern again is with mining as an activity that turned subjects away from agriculture (誤農業) and led to “congregations of several ten-thousand men who tilled no fields” (聚集數十萬不耕之人), thus causing poverty and subsistence problems to the miners themselves but also to the surrounding area. The agriculturalist perspective on mining was focused on an insoluble problem and the permanent worry of the Confucian ruler of feeding his subjects and keeping them content (養民).

1.2 Ming and Qing written sources: The natural environment

A handful of records mention the natural environment.

In the mounting criticism to the expansion of mining in Yunnan in 1511, He Mengchun 何孟春 (1474–1536)², a high-ranking metropolitan official raised the issue of earthquakes in the context of mining:

奏：聞外天下近年地震之變，雲南獨多。雲南地方地震之變，銀場尤甚。實由銀礦採空深酷有傷地脉以致陰道不寧故也。變必有應，患當預防。今螳螂、母喜、龜山一帶盜賊出沒，人民饑窘，萬一勢激利動結構召集重貽境內大患。(何文簡疏議)

Based on reports to the throne, He was aware the earthquakes were frequent in Yunnan. He also found that frequency coincided with mining areas and deduced that deep mining caused disruptions in the earth veins and hence was responsible for the disasters. It may be added that he is not geographically specific beyond old and loosely defined areas. These in fact contained mines, but also covered large areas. The connection between earthquakes and mining was an argument rather than an observation.

Shen Rilun 沈日霖, who held positions in the supervision of the examination system in Guangxi province in the early 19th century, provided a more specific and nuanced view in his private writings:

² 字子元，湖廣承宣布政使司郴州（今湖南省郴州市）人。明朝政治家，官至吏部左侍郎。

愚按，开矿之役，其利有三，其害亦有三。上而裕国，下而利民，中而惠商，比三利也。然而开山设厂，每不顾田园庐墓之碍，而且洗炼矿砂之信水，流入、河中，凝而不散，膩如脂，毒如鸭，红黄如丹添，车以粪田，禾苗立杀，其害一。又开矿之役，非多人不足给事，击者、挖者、捶者、洗者、踪者、奔走而挑运者、董事者、帮闲者，每一厂不下百余人，合数十厂，则分布数千万游手无籍之人于荒岩穷苦中，奸究而托迹，么么得以乘机，祸且有不可知者，其害二。又开矿者，每在山腰及足，上实下虚，势必崩塌。昔年回头山穿穴太甚，其山隆然而倒，数百人宅罗其中，长平之坑，不加其醋。况乎砂非正引，土性松淫，随掘随塌，更属可危，则矿而家也，匠而鬼也，利可祸坑也，不亦大可哀乎？其害三。吾愿当事者留于此，踏勘得踏实在旺盛，方准承开，否则宁封禁，息事宁人。于后国以太道，利民以本富，惠商以宽政，将见天不爱道，地不爱宝，而无形之矿，有百千万倍于粤山者，何区区铅铁之足云！

(Yuexi suoji 粤西琐记 (Miscellaneous Accounts of Guangxi Province, excerpted in QDDKY, 49 - 50)

Shen recognized three benefits of mining: the generating of revenue for the state (裕国), allowing the population of reaping benefits (利民), and benefiting the merchants (惠商). The wording is classical, but the tone noticeably different from all preceding texts, especially in the inclusion of the merchants or the entrepreneurs who operated the mines as members of society who had a positive role.

The three benefits were however offset by three calamities (害). The first was the mines encroached upon and dug up fields, gardens, houses and graves, while the water used for washing the ores ran off into streams and rivers, causing pollution and remaining poisonous for a long time.

The second was the large workforce that amounted to at least a hundred men per mine and for a mining area of several ten mines reached several thousand or even ten-thousand men without local registration who might become a scourge to the area.

The third were the destabilisation of mountains. Because mines were located on mountain slopes, large-scale mining could lead to collapsing cavities and in on known example had caused a landslide that buried several hundred houses. Shen added that galleries in loose rock were frequently caved in, killing those who worked them for a living.

Shen is more specific on the calamities than on the benefit, which he obviously regarded as outweighing the benefits. His view is opinioned, yet evidently based on specific information, probably including personal experience.

His description addresses factual pollution and environmental problems caused by mines. The first concerned the surrounding area and included the occupation of arable land, the pollution of water bodies with heavy metals and other toxic sediment, while the second were more localized, comprising collapsing underground cavities and underground accidents.

A very late Qing collection of notes was left by He Zongzhang 贺宗章, an otherwise unknown writer who appears well-connected in Yunnan and took down his memories around 1900. He mentions the silver mines of Yongbei:

“如永北银厂，吾友刘春霆云曾办过，x 昔规模阔大，永北同知，日进陋规大银一锭五十余两，以为常。矿门苗路如昔，厂屋器物犹存，附近有数老民，年八九十，壮时曾充矿丁，尚能逐一指点，仍循原路掘入，办理二年，迄不得手，闻停办时苗x旺。一日，忽闻对山之上，有猿猴千百成群，呼号奔逐，负矿砂丁出入各洞，众至数千，互相惊异，纷纷出洞瞻望，山忽坐崩，各洞门路，概为土石堆压，按名点验，尚有七百余人

未出，立即停办。在内砂丁，其后开窿时，间一遇之，面目如生，见风则腐云。” (*Huanjing tan* 《幻景谈》，undated manuscript, reprinted in *Yunnan Shiliao congkan* 《云南史料丛刊》卷12，第142页)

He obtained his information from “his friend Liu Chunting”, who had served as magistrate in the sub-prefecture and hence knew precisely about the income derived from customary taxes. He also records that at mines and buildings were still in place, and old men of 80 to 90 years of age would remember details from when they worked the mines as young men. The dating is uncertain. We have no dates and little further information on He Zongzhang; there is no known gazetteer of Yongbei and hence no means of dating the term of office of the otherwise also unknown Liu Chunting; and the time of writing is uncertain. Based on the time, when the old men would have been young an assuming the time of writing between 1900 and 1912, we would expect that the flourishing period that ended in the fateful accident certainly predates the mid-19th century civil wars. The mines can be identified as the Baijiu mines in present-day Ninglang, which flourished roughly between the 1830s to 1850.³

According to He Zongzhang, mining ended in a frightful accident, probably caused by an earthquake, during which the mountain flank collapsed. The account adds an event that turned out to foreshadow the event, with hundreds of monkeys running past, screaming loudly. Most workers in the mines, several thousand in number, came out to watch, whereupon the mountain shook and all galleries caved in, killing over 700 miners who had still been at work.

一日，忽闻对山之上，有猿猴千百成群，呼号奔逐，负矿砂丁出入各洞，众至数千，互相惊异，纷纷出洞瞻望，山忽坐崩，各洞门路，概为土石堆压，按名点验，尚有七百余未出，立即停办。

The story records and oral tradition that Liu or He had heard on location. It links natural disasters with foreshadowing events that in fact were a warning in saved many lives.

The late Qing *biji* records provide a new perspective on mining and on environments. They show little interest in integrating nature with a moral and political worldview but were more interested in the local and the specific.

2 Oral histories

Oral traditions that Yang Yuda and myself encountered during fieldwork on 19 silver mining and five copper mining sites across Yunnan province typically contain elements that often closely resemble each other.

They cover three aspects of environmental problems caused by mining:

- (1) Air pollution: At many sights, we were told that birds used to drop dead from the skies when the smelters were in full operation in the past.
- (2) The notion that in opening the mines, originally mobile underground veins or animals had to be fixed in place.
- (3) Stories of major mining accidents with premonitions, typically an old lady turning up out of season to sell peaches, making the men to come out of the mountain before galleries collapsed. The old lady is often identified as Guanyin.

Discussion

The written sources show a perception that with few exception is exclusively concerned with the realm as a human geography that has to be administrated in terms of ordering and channeling the lives of subjects for stability.

³ Lin Zexu.

In the oral traditions of Yunnan, we find virtually no overlap with the written sources. He Zongzhang's account, although appearing a text that can be regarded as literary, is a record of an oral tradition.

Oral traditions mention air pollution but no problems with water pollution or damage to arable land. This may be due to the fact that all mines were located in mountain areas where agricultural development followed the mining settlement but was little established before.

The stories on the discovery and fixation of orebodies and on major accidents that involve magic appear to be part of a mentality that linked the human and the natural world by magic that remained inexplicable or only half-explained by saviour deities, such as Guanyin. It was worlds apart from the human-centered worldview of Confucianism.

The study provides an assessment of environmental and moral concerns and hazards of mining in the late imperial period.