



Mining-induced displacement and resettlement in China: A study covering 27 villages in 6 provinces



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ABSTRACT

Underground mining in China has incited severe land subsidence causing the forced eviction of millions of farmers. Here we report on one of the earliest Chinese studies on Mining-Induced Displacement and Resettlement (MIDR), based on a farm household survey ($n = 230$) and semi-structured interviews ($n = 29$) in Shaanxi, Shanxi, Shandong, Jiangsu, Chongqing and Hunan. It was found that displaced farmers were overall insufficiently compensated for mining-induced damage. Respondents expressed concerns over higher living costs in the relocation villages, and were ill-informed about resettlement schemes. We also found widespread conflict between farmers, mining companies and local government, this being the case in over two-thirds of the surveyed villages. Through additional institutional analysis it is ascertained that existing policies and laws predominantly focus on surface rather than underground mining. Compensation is rarely provided unless damage to land and housing has grown to unmanageable proportions. In result, displacement and resettlement is generally chosen as a sole, yet, final solution. The study includes cases on coal, lead, zinc and manganese. Based on the analysis, we call for a revision of mining policies and the establishment of state-supported compensation schemes in order to minimize conflict and farmers' socio-economic vulnerability.

1. Introduction

China boasts a substantive amount of mineral resources. It has, for instance, the world's second largest reserves in lead and zinc, the third largest in coal, and the sixth largest in manganese (Zhang et al., 2011; Lin and Liu, 2010). An important proportion of these minerals is excavated through underground mining rather than surface or open-pit mining (State Council, 2003a). In the case of coal, even 95% is produced from underground mines (as compared to 31% in the United States and 22% of in Australia; Bian et al., 2010, p.217). Underground mining is also prevalent for lead, zinc (Zhang et al., 2011), and manganese (Wang, 2007).

The alleged "blessing" of China's mineral resources has come with a downside, as underground mining has led to severe land subsidence (Bian et al., 2010). Reports about 'floating villages' (*xuankong cun* in Chinese) have made media headlines. The term describes villages located on land hollowed out due to underground mining. Problems are painfully visible: cracks appear in houses, wells dry up, while growing crops becomes challenging due to sinkholes and receding cropland. In Shanxi Province, one of China's foremost coal mining areas, there are reportedly over 1000 'floating villages', forcing farmers to be moved out (Xinhua, 2015, p.1).

It is estimated that the number of displaced people in Shanxi alone is more than 2.3 million, a figure that exceeds the amount of persons displaced by the Three Gorges Dam (Zhang, 2013; Xinhua, 2015; VanderKlippe, 2015). In addition to land subsidence induced by coal mining, subsidence induced by exploitation of metal ores, such as lead, zinc and manganese, have also been reported (Wu et al., 2009; Diao et al., 2006). In result, underground mining has led to tension and conflict between the mining industry, local authorities and farmers (Zhao and Li, 2013; Zhang, 2013; Wang and Yuan, 2013). The large-scale acquisition of land is a significant driver for displacement in mining areas (Ahmad and Lahiri-dutt, 2006; Abuya, 2013; Madebwe et al., 2013). However, in the Chinese context, displacement and resettlement by and large occurs *after* land subsidence has taken place. Markedly, the displacement and relocation of entire villages appears to be more frequent in China as compared to other countries (World Bank, 2008, p.94).

In this context, the paper focuses on three research questions: 1) What are the economic and social consequences of mining-induced resettlement for farmers in China? 2) What are the institutional factors that influence mining-induced land subsidence and displacement? 3) Why do relocation and resettlement in China generally occur after land subsidence?

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This study zooms in on what is scholarly known as “Mining-Induced Displacement and Resettlement” (hereafter: MIDR). In so doing, it is situated in the larger body of research on “Development-Induced Displacement and Resettlement” (or DIDR). DIDR is often regarded as an activity that can be planned because the “cause of the displacement is a predictable, intentional, scheduled and largely regulated event” (Owen and Kemp, 2016, p.1228). In this context, researchers have developed the Impoverishment Risks and Reconstruction (IRR) model (Cernea, 1997), and various guidelines (World Bank, 2001,2013; ADB, 1998; IFC, 2002). The premise of such guidelines is that the nature, timing, and intensity of the displacement can be forecasted and managed.

However, Nor-Hisham and Ho (2016) ascertained that many guidelines actually serve the legitimization of resettlement schemes that should never have occurred. In this regard, they identified three pre-conditions that constitute a ‘no-go-area’ for any project, particularly, when land-dependent and resource-poor communities are involved. Similarly, Owen and Kemp (2015,2016) challenged the belief that planning could serve as a protective mechanism for development-affected people, with particular reference to those affected by mining, as a large proportion of resettlement takes place during the operational phase. Moreover, the uncertainty of land use requirements and the volatility in commodity markets reduces the ability to plan for resettlement. In this context, ex ante social and environmental impact assessments provide little guidance on how to evaluate the dynamics in socio-economic and ecological effects that result from mining (Banks, 2013). Owen and Kemp (2016) therefore suggest that MIDR must also account for the *unplanned* elements of mining.

The studies cited here have made a significant contribution to the understanding of the social and economic impacts of development projects, and the potential measures to mitigate the effects of displacement and resettlement. Whereas a large portion of these studies focuses at the project-level, this paper would like to zoom in on the macro-level institutions that underlie MIDR, while examining how these affect land users at the micro-level. Institutions are here defined in a broad sense, as a set of rules that comprises land rights, policies and regulations (Ho, 2016, p.1129). Previous studies on DIDR in China have mostly focused on the impact of infrastructural and environmental projects, such as for ecological migration (or *shengtai yimin*, Nakawo et al., 2010) and the Three Gorges Dam (Wang et al., 2013; Heggelund, 2006; Jackson and Sleigh, 2000). Contrarily, the impact of Chinese mining-induced displacement and resettlement has to date received much less attention in the international literature.¹ It is why this study might make an important contribution to understanding the dynamics of MIDR in one of the world's largest emerging and resource-rich economies.

The paper is structured as follows. The following Section 2 presents the methodology, research sites, sample features, and a framework for the institutional analysis of MIDR in China. Section 3 describes the national institutional structure described along the various aspects of our MIDR framework. Section 4 presents the results of the survey and interviews in the relocation and non-relocation villages. The paper ends with a discussion and conclusion.

2. Methodology and sources

2.1. Research sites

From an official list of mineral resource-based counties issued by the Chinese State Council (2013), eight were selected for our research. The county was selected as a basic site due to its importance as an

administrative node, where numerous tasks and duties of the Chinese state converge.² The counties were selected because they:

- 1) Represent different stages of mineral resource-exploitation: i) the developing stage (Shuozhou, Binxian); ii) maturing stage (Hancheng, Jinjing, Xiushan, Huayuan); iii) depletion stage (Tengzhou); and iv) mine reclamation or recovery stage (Peixian) (State Council, 2013).
- 2) Reflect China's geo-ecological diversity, and are situated in the east coast (Jiangsu and Shandong Province), northwest (Shanxi and Shaanxi Province) and southwest (Hunan Province and Chongqing Municipality), representing the plains, arid steppe, and mountainous areas. Note that different geological environments contribute to different problems: e.g. land collapse, sinkholes, ground fissure, and subsidence tend to occur more often in the plains, while landslides and collapse are more common in mountainous terrain.
- 3) Reflect significant economic variation. The eastern coastal provinces in which the counties are located are relatively wealthy (i.e. GDP per capita in 2014 in Jiangsu and Shandong is respectively 81874 and 60879 Yuan); while the inland provinces are relatively poor (GDP per capita in Shanxi, Hunan, Shaanxi, and Chongqing is 35064, 40287, 46928, and 47859 Yuan), (National Bureau of Statistics of China, 2015).
- 4) They represent different under-ground mineral resources (see Table 1). Six counties are notable for coal mining, and two are predominantly involved in metal ore mining. The latter two are located in Chongqing Municipality and Hunan Province, ranked among the nation's largest producers of zinc, lead and manganese (Zhang et al., 2011; Wang, 2007).

Within the counties, a total of 27 villages were selected. Of these, 11 relocation villages were chosen based on a literature review of government and media reports. The relocation village is not a ‘traditional’ rural village, where each household has a one or two-story house scattered in space, but consists of newly built and spatially-planned condominium complexes. The relocation villages are in general located on the outskirts of the township seat. Relocated farmers did not receive any new agricultural land in the relocation village, but were dependent on land in the original village. Most of the studied villages were relocated 1–2 years before the fieldwork was done, while in others the relocation occurred approximately 10 years ago (see Table 1). The time span of mining varied from 10 to 50 years, while the size of the mines ranged from small to large (as measured by annual production capacity).³ In addition to the 11 relocation villages, the survey was conducted at 16 adjoining villages that had not been scheduled for relocation (yet, were still prone to mining-induced land subsidence).⁴

2.2. Survey and interviews

The fieldwork comprised a survey and semi-structured interviews. The survey was carried out, between June and September 2015, by a team of specially trained, local undergraduate students, supervised by one of the authors. To prevent bias in answering the questionnaires, a household-to-household, non-probabilistic approach was utilized while group meetings or group discussions were intentionally avoided. Individuals, not necessarily the head of the family, were selected and

¹ This is not to say that other effects of Chinese mining have not been studied, see for instance, the seminal study by (Lu and Lora-Wainwright, 2014). Yet, for reasons of space, we only report on the findings that relate to MIDR. Other findings in relation to employment, livelihood and environment are not included here.

² There are five levels of local government in China: the province (equivalent to the autonomous region, municipality under the State Council, and special administrative region), prefecture, county, township, and village.

³ By scale, coal mines in China are divided into 3 types: large, medium-sized, and small, whose annual production capacity is larger than 0.9, 0.3–0.9, and below 0.3 million ton per year, respectively (Shen and Gunson, 2006, p.429). This classification mostly applies to other minerals as well.

⁴ The 16 non-relocated villages are distributed as follows: Binxian 4, Hancheng 1, Shuozhou 3, Yanzhou 3, Tengzhou 1, Peixian 2, Xiushan 1, and Huayuan 1.

Table 1

Sample regions and the relocation villages.
Source: This fieldwork

Province	County	Relocation villages				
		Type of mineral	Mining since year	Size of mine	Relocated persons/ households	Year relocated
Shaanxi	Binxian	Coal	2006	Large	Ca. 1000 persons	2013
	Hancheng	Coal	1980	Medium, and multiple small	923 persons	1984/2004 ^a
Shanxi	Shuozhou	Coal	1995	Medium, multiple small	Ca. 50 households	2015
Shandong	Yanzhou	Coal	1981	Large	4 villages, 1120 households	2006
	Tengzhou	Coal	1960s	Large	421 households	2014
			1960s	Large	19 villages	2014
Jiangsu	Peixian	Coal	1976	Large	1248 individuals	2014
			1986	Large	986 households, 3250 individuals	1989/2008 ^a
Chongqing	Xiushan	Manganese	1960s	3 medium	98 households, 440 individuals	2014
			1998	Multiple small	Ca. 200 individuals	2014
Hunan	Huayuan	Zinc/Lead	1980s	Multiple small	Ca. 40 households	2008

^a indicates the village has been relocated twice.

interviewed. In total, 230 valid questionnaires were collected, consisting of 120 relocated households and 110 non-relocated households.

The survey sample included 70% male respondents and 30% female respondents. The majority (56.5%) was older than 50 years, reflecting the increasing left-behind elderly in rural China (Pang et al., 2004). The level of education was equally distributed between respondents, ranging between no education and those holding a university degree. The average household size was 4.84. The Chi-square analysis using SPSS found no significant differences in gender, age, household size, and educational level between relocated and non-relocated respondents (see Table 2).

Although the sample itself is not representative, a higher degree of representativeness was attempted through theoretical saturation to determine the sample size, up to the point where additional data provided no new insights into the research questions (Small, 2009; Morse, 2004). In addition, a higher degree of validity (data accuracy) and reliability (data consistency) was sought after through the purposive selection of the research sites as described in Section 2.1.

The full-scale survey was preceded by a pilot in three sites in April and May 2015,⁵ and coupled to semi-structured interviews with 29 key informants, including officials in the county mining and land administration departments, mining right holders, interviewees from the mining association, cadres from the township government, and a dozen local farmers. Lastly, participatory observation was conducted with regard to the assessment of mining land reclamation reports, for which a mining expert review meeting was attended.

As can be expected, MIDR is sensitive, not in the least, in the eyes of local authorities and mining companies. To protect the rights and interests of the respondents, the survey and interviews did not record or store personal data. The research was overseen by the Ethics Officer of the European Research Council and an independent Human Research Ethics Committee of the Delft University of Technology. No interview or survey was carried out without prior informed consent from the respondent.

2.3. An MIDR framework

For the purpose of our research, we developed a framework for the institutional analysis of MIDR in the Chinese context. The institutional arrangements that are deemed relevant have been categorized along four dimensions as depicted in Fig. 1.

The first institutional dimension of the framework involves examining the existing land rights and rules for expropriation. In many countries, land acquisition laws stipulate that the government can

acquire land for public use, providing a legal basis for the acquisition of land for mining, and consequently, the displacement of residents. Yet, in many instances, (indigenous) communities that use land on the basis of customary rights are not at all expropriated on the basis of legal procedures, leading to significant conflict (Nor-Hisham and Ho, 2016; Mathur, 2006).

The second dimension that needs consideration involves the principles of voluntarism, transparency and self-determination. Over the past decades, development projects predicated upon *involuntary*, forced displacement have been pervasive. In this context, the concept of 'Free, Prior, and Informed Consent' or FPIC is increasingly being promoted as a means to ensure the right of self-determination for affected peoples (Hanna and Vanclay, 2013; Owen and Kemp, 2014).

The third dimension concerns compensation. An often disregarded truth is that land in a developing context plays a critical role in social security and welfare (Ho, 2014; Guhan, 1994). It is why the amount of compensation is usually inadequate (Mathur, 2006; Abuya, 2013). Cash compensation is insufficiently translated into new productive assets, due to an absence of local capacities, alternative employment, and access to (vocational) training (Szablowski, 2002; Bainton and Macintyre, 2013). For this reason, scholars have suggested that compensation schemes should be integrated into resettlement legislation and practice (Cernea, 2008; Cernea and Mathur, 2008).

Table 2

Characteristics of respondents in the survey.

Source: This survey

Category		Relocated sample (n = 120)	Non-relocated (n = 110)	Subtotal (n = 230)	χ^2 Value
Gender	Male	67.5%	72.7%	70.0%	0.385 ^{ns} , P =
	Female	32.5%	27.3%	30.0%	0.535
Age	18–30	12.5%	10.0%	11.3%	8.332 ^{ns} , P =
	31–50	32.5%	31.8%	32.2%	0.080
	> 50	55.0%	58.2%	56.5%	0.671 ^{ns} , P =
Level of education	Illiterate	21.7%	22.7%	22.2%	0.955
	Primary school	25.8%	27.3%	26.5%	
	Middle school	36.7%	37.3%	37.0%	
	High school	11.7%	9.1%	10.4%	
	University	4.1%	3.6%	3.9%	
Household size	≤3	34.2%	24.5%	29.6%	5.544 ^{ns} , P =
	4–5	38.3%	32.7%	35.7%	0.063
	≥6	27.5%	42.7%	34.8%	
	Mean	4.45	5.26	4.84	

^{ns} = Non-significant at P > 0.05.

⁵ Conducted in Xiushan County in Chongqing, Huayuan County in Hunan, and Songtao County in Guizhou Province.

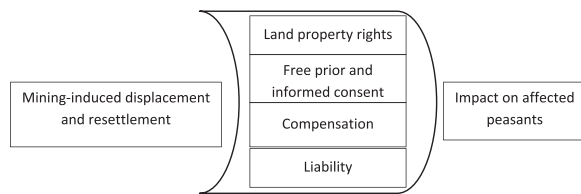


Fig. 1. Analytical framework of MIDR in China.

Source: Illustrated by authors

The fourth and final dimension concerns legal liability. Developers are regarded as the central actors for planned resettlement (Owen and Kemp, 2016). However, developers often have no compelling reason to do more than the legally required minimum, even more so, in a developing context. As a result, evicted peoples and governments often need to bear the costs of an unacknowledged liability left by developers (Downing, 2002).

In the following section, the MIDR framework is applied to the macro level, as well as the micro level. To assess the legal loopholes and deficiencies that affect the governance of MIDR, we will start by reviewing national laws and regulations. The institutional analysis includes the legal provisions that can be found scattered over the 2004 Land Administration Law, the 1996 Mineral Resources Law, the 1996 Law on Coal, and various governmental notices and decrees. Subsequently, a micro-level view will be provided, based on the survey and semi-structured interviews with relocated and non-relocated farmers.

3. Analyzing MIDR: the macro level

3.1. Land property rights

As duly noted by Mathur (2006) laws that specifically deal with resettlement are by and large lacking. What often exists are laws that stipulate the acquisition of land, and provide a legal basis for government acquisition of land for the public interest (Abuya, 2013; Mathur, 2006; Ahmad and Lahiri-dutt, 2006). The same is true in the case of MIDR in China, as there is no law that addresses mining-induced resettlement. Instead, resettlement as a result of land loss is regulated under the 2004 Land Administration Law.

In the Chinese context, ownership of mineral resources and land is separated. While mineral resources belong to the state, the land above can be owned by the state or the collective (slightly comparable to Australia, where mineral resources are owned by the Crown, while land is owned by the Crown or private persons). In order to start mining, one needs to obtain the mining right, as well as the land use right (while the mining exploration right is separately dealt with in China). There are separate procedures to acquire these two rights.

In accordance with the 1996 Mineral Resources Law (NPC, 1996a) or the 1996 Law on Coal (NPC, 1996b), government at the county level and above (depending on the scale of mining) can allocate mining rights to users. These rights can be accorded to: 1) central and local state-owned companies, and; 2) collectively owned companies also known as Township and Village Enterprises (or TVEs, collective enterprises, originally set up in support of agricultural production during the Mao era); and 3) enterprises that are partly or wholly foreign-owned.⁶ In the 1990s, the central government strongly stimulated the development of coal-mines owned by TVEs, and their annual output accounted for a substantial proportion of coal output, reaching almost half of the total national output in the mid-1990s (Rui, 2005; Shen and Andrews-Speed, 2001; Wright, 2006).

Land acquisition is regulated under the Land Administrative Law (NPC, 2004). Rural collective land needs to be expropriated by the state

prior to mining and commercial construction, with the exception of a limited area designated as 'construction land' for use by the collective (Chan, 2003).⁷ In the process, land ownership is transferred from the collective to the state. The original land owner (i.e. the village) and users (i.e. the farmers) are compensated for land loss by the acquiring authority, which in most cases is the county. The maximum amount for the costs of resettlement and compensation for land loss is capped at 30 times the annual land productivity (Art. 47, Land Administration Law, NPC, 2004). Subsequently, the use rights to converted state-owned land can be assigned to new users in a commercial (against a premium, e.g. for companies or industries), or non-commercial way (against a below-market fee or for free, e.g. for public bodies, schools, and hospitals).⁸

However, there are legal loopholes. For one, the Land Administrative Law, and other relevant laws and regulations, do not stipulate what mining land comprises, as that relates to different areas, including the surface for open pit mining; for office and processing complexes; and for overburden and tailings or mine waste (MLR, 2013; Li, 2014; Sun and Xiao, 2011). This issue was later addressed in a formal interpretation by the Workgroup on Mining Land Use Policy initiated by the Ministry of Land and Resources, which defined that mining land was to be understood as the operational areas for surface mining, as well as the area for mining waste and tailings (MLR, 2013, p.1).

In line with this, land acquisition, resettlement and compensation procedures apply to open-pit mining where the surface land is directly occupied and used. In contrast, in the case of underground mining, where the surface land is *not directly occupied and used* by mining companies, there is no legal requirement for expropriation of collectively-owned land. This becomes a problem when rules for compensation and FPIC for underground mining are absent. As will be ascertained below, these are precisely the areas where other legal loopholes are lurking.

3.2. Free, prior and informed consent

The Chinese legal framework is practically undefined with regard to the second dimension of MIDR, i.e. the principle of FPIC, defined as:

- Free, implying that there is no manipulation or coercion;
- Prior, meaning that agreement is sought in advance of the mining;
- Informed, requiring sufficient information on the mining, including its nature, impact, reversibility, rationale and duration;
- Consent, referring to a negotiation between the government, mining company, and farmers in which participation and consultation are safeguarded.

In its first administrative measure in 1980, the State Council required mining companies to inform affected communities. Yet, markedly, in the same measure it is stipulated that:

"[C]ommunities are not allowed to build residences and factories within the mining area without permission; if not, the coal mining company cannot be held accountable for relocation and compensation" (Article 6 State Council, 1980).

It thus appears that communities need to inform and ask permission from the mining companies, rather than vice versa.⁹ Moreover, when housing construction and land use occurs *after* mining has taken place, relocation and compensation is no longer the responsibility of the mining company (unless it was explicitly allowed by the company).

⁷ As is the case for the TVEs and for public buildings of the village, such as for office use, schools and infirmaries.

⁸ For more information on the rural and urban land markets, see (Ho, 2013).

⁹ This was stipulated again in the 1996 Law on Coal (Article 60 NPC, 1996b).

⁶ However, official figures have not recorded any output from such foreign enterprises (Wright, 2006, p.168).

These regulations might perhaps make some sense from the perspective of open-pit mining (which, as we have seen above, requires the *ex ante* acquisition and compensation of rural collective land). Contrarily, they become instantaneously problematic when underground mining is involved, because the consequences of underground mining: 1) might only become apparent many years after mining has already commenced; 2) might occur in a completely different geographical location where the above-ground administrative, processing and waste facilities are situated.

Following the same logic for open-pit mining, and pressured by the nation's growing demand for coal, the State Council ordained in its 1983 measure:

“Villages with coal underneath shall move within the prescribed time limit. If they do not abide by this, the coal mine can extract coal *at will*. Any loss and damage shall be borne by the local government and the household(s) that are unwilling to move, and will fall *outside* the responsibility of the coal mining company” (Article 2, [State Council, 1983](#), italics added).

In this measure, the State Council ruled out the consent of the land owner, thereby enabling the mining company to extract without consent or without prior notification. Also, in later years, the principle of FPIC has not been included in laws and regulations.

It should be noted that our research found no evidence that Environmental Impact Assessment (EIA) plays a significant role in preventing or mitigating MIDR. For one, EIA focuses on air, water, solid waste, and noise pollution and is the jurisdiction of the Ministry of Environmental Protection. In contrast, land subsidence and reclamation are the authority of the Ministry of Land and Resources and its subordinate departments ([Cao, 2007](#): p.478), which as referee and player, are contradictorily also charged with the exploitation of mineral resources.¹⁰

3.3. Compensation standards

Under the current institutional framework, villages and farmers have no legal basis to protect their interests until damage on the surface has occurred. Moreover, when evidence is lacking during the mine's construction or early operation phase, villages and farmers have no formal rights to claim compensation. There have been many discussions about the need for revision of the long outdated 1996 Mineral Resources Law, and the 1996 Law on Coal. However, at the time of this writing, mining laws adopt the possibility for compensation only in a passive and *ex post* manner. For instance, aforementioned laws merely stipulate:

“[A]nyone who, during the mining of mineral resources, causes losses to the production and well-being of other persons shall be liable for compensation and shall adopt the necessary remedial measures” (Art. 32, Mineral Resources Law, [NPC, 1996a](#); Law on Coal, [NPC, 1996b](#)).

Unlike resettlement due to urban construction and hydropower development, national law ([State Council, 1980](#); [NPC, 1996a](#)) provides no standards for compensation induced by mining ([Liu et al., 2006](#); [Lu, 2002](#)). As a result, the compensation to property damaged by mining is estimated according to local standards.

Paradoxically, few local governments have set rules on the com-

¹⁰ There are also no indications that Resettlement Action Plans (RAPs) as part of the EIA are systematically formulated. As [Owen and Kemp \(2015, p.280\)](#) mention: “[T]he practice of making RAPs publically available is rare, and where RAPs are released for public consumption, it is often to satisfy lender requirement, rather than to build or support knowledge in this area.” In the database on RAPs worldwide by Kemp, only 1 case was found in China, prepared to satisfy the requirements for an Asian Development Bank loan. Amongst the 27 visited villages, our fieldwork only identified one case in Gaolou Village, Xiushan County.

ensation for land affected by mining-induced subsidence, while the standards are low. For instance, in standards set by Jiangsu Province, collective land subject to subsidence of over 1.5 m (and no longer usable for agriculture) shall be requisitioned and compensated at a maximum of 14,400 Yuan per mu (1/15th hectare), or 12 times the Annual Land Productivity (ALP) (1200 Yuan/year/mu) ([Jiangsu Provincial Government, 2004](#)).¹¹ This is well below the compensation for land expropriated for urban construction (30 times of ALP) and hydropower development (16 times of ALP). Moreover, according to calculations by [Deng et al. \(2010, p.26\)](#), the actual reclamation costs have increased from 2,500–4500 Yuan/mu to 5000–10,000 Yuan/mu, and can be even as high as 30,000 Yuan/mu. At the time of writing, most other mineral resource-rich provinces do not have such regulations, and compensation is based on piece-meal negotiations between the mining companies and affected farmers.

Regarding the compensation for housing, three methods can be distinguished. The first is household-based compensation. According to this method, each household, regardless of the number of individuals, is entitled to a fixed amount (as is the case, for instance, in Xiushan County, Chongqing) or a payment in kind (e.g. Binxian County, Shaanxi).¹² The second method is floor area-based and calculated by the total area of the house multiplied with a pre-set standard. The building material is at times considered. Shandong Province, for example, compensates a house constructed with earth and timber against 150 Yuan/m², compared to 250 Yuan/m² for a house built with brick ([Shandong Provincial Government, 1989, 1999](#)). The calculation for each individual house entails considerable transaction costs. To simplify procedures, a mix between the first two methods has been developed. According to the third method, each member of the household is entitled to a specified area size multiplied with a fixed compensation. By illustration, Jiangsu Province entitles each household member to 25 m² of housing against a compensation fee of 180 Yuan/m², which amounts to 4500 Yuan per person ([Jiangsu Provincial Government, 2004, p.1](#); [Deng et al., 2010](#)). As we will see in [Section 4.3](#), the compensation for housing is often insufficient to allow resettled farmers to purchase new housing in the relocation village.

3.4. Legal liability

In this section, we examine the final dimension of Chinese MIDR, the issue of legal liability. The principle that whoever causes damage shall be liable, in other words, the Polluter Pays Principle (PPP) or in our case, “Miner Pays principle”, for that matter, has to some extent been incorporated in laws and regulations since the early 1980s. In its first Administrative Measure on Coal Extraction under Buildings and Villages, the [State Council \(1980\)](#) stipulated that the mining company is responsible for the costs of relocation (article 4). The principle was reiterated in ensuing legal rules.¹³

In the course of time, however, rising mining-induced land subsidence has displaced millions of farmers and has triggered major conflicts ([Zhang, 2013](#)). Local authorities and representatives of the local People's Congresses have submitted several proposals requesting funds from the central government to resettle people ([Liu, 2015](#)). To deal with these problems, the central state pushed forward a more pragmatic approach since 2003.

¹¹ For subsidence between 0.5 and 1.5m, the mining company shall pay 2,500–4,500 Yuan per mu to the collective for reclamation (i.e. restoration of the land to its original state, a responsibility normally charged to the mining company and not the collective). For land subsided less than 0.5m, mining companies shall pay the peasants only compensation for agricultural loss capped at 750 Yuan/year/mu.

¹² In Xiushan County affected people were treated similar to those affected by earthquakes, rainstorms, and hail, providing each household with 50,000 Yuan. In Binxian the compensation consisted of housing in the relocation village.

¹³ For example, article 32 of the *Law on Coal* ([NPC, 1996b](#)), article 32 of the *Mineral Resources Law* ([NPC, 1996a](#)), and article 5 of *The Regulation on the Prevention and Control of Geologic Disasters* ([State Council, 2003b](#)).

In the notice on ‘Speeding up in dealing with coal mining subsidence’ (NDRC, 2004), the powerful National Development and Reform Commission regulated to address land subsidence – but only related to coal – by differentiating the timing and ownership of the mining project. First, compensation for land subsidence caused after the 2003 notice, would have to be dealt in line with the Polluter Pays Principle. Second, compensation for *existing* land subsidence (i.e. prior to 2003) caused by *key state-owned* coal mines, would be partly paid by the central government (varying between 20–50%),¹⁴ while provincial and lower authorities, mining companies and individuals would have to contribute the remainder. Third, for *existing* land subsidence induced by *local state-owned* and *collective TVE-operated* coal mines, no funds would be provided by the central government, and the costs would have to be borne by the governments at and below the provincial level, mining companies, and individuals.

Throughout the reform period to the mid-1990s, SOEs have contributed to a decreasing share of output. In mid-1990s, the share of TVE coal mines peaked, accounting for almost half of the national coal output. In late 1990s, the Chinese government initiated a systematic crackdown on small mines. Correspondently, the share of TVEs out of the national output dropped from half to 23.9% in 2001. However, the crackdown on TVEs is ineffective (Andrews-Speed et al., 2003, 2005), and its share gradually increased to around 38% in the 2000s (Fig. 2). Meanwhile, TVEs are small scale and their number reached more than 100,000 in 1991 (Tu, 2011, p. 10). Even after the closure policy, there were still 21,759 registered TVE mines in 2002, in contrast, there were only 656 central SOEs, and 2014 local SOEs in 2002 (Wang, 2004, p.88).

To get a sense of the magnitude and proportion of the caused damage between key state-owned versus local state and collective-owned (or TVE-operated) coal mines, we might turn to Shanxi Province, one of China's vital coal mining regions. The number of people affected by land subsidence induced by local state and collective-owned coal mines was almost 2.7 times higher than those affected by key state-owned mines (or 1.6 million persons as compared to 0.6 million) (Zhang, 2013, p.94). Although perhaps logical from a “Miner Pays” perspective, as the local state and collective mines are held liable for the bulk of the costs for their caused damage, the current manner of compensation might be inadequate in light of the skewed proportion of damage caused by local state/collective versus key state mines. In other words, the sheer extent of the damage raises questions whether the local state, and more importantly, the (smaller and fragmented) collectives, will be able to foot the bill. Furthermore, one may also question why the central government is only partially liable for damage caused by key state-owned mines, while local government and collectives are fully liable for damage caused by the mines under their operation.

Based on the previous review, the institutional framework on MIDR in China can be summed up as follows. One, laws and regulations are primarily focusing on externalities caused by above-ground, rather than underground mining activities. Two, the principle of Free, Prior and Informed Consent for people affected by mining is not recognized in national law. Three, there are no national regulations and standards for compensation for mining-induced damage and resettlement, while local standards are few and set too low. Four, although the Polluter Pays Principle has been included in some mining laws and regulations, this is only partially so (mainly related to coal), while the distribution of the liability between central and local state/collectives still needs readjustment.

We believe the current institutional framework described above to be at the root of the tensions and conflict over land subsidence and forced displacement in the mining areas. The four institutional

dimensions discussed here will be applied as a benchmark for further comparison with the survey results in the next section.

4. Survey results

4.1. Land rights: subsidence displaces, not land expropriation

During the fieldwork, it became clear that mining-induced land subsidence is the major cause of farmers' displacement and resettlement, instead of land expropriation. In the 27 investigated villages, the latter occurs on a small scale: 12.5% of the respondents in the relocation villages and 31.2% of the respondents in the non-relocation villages state that part of their land was expropriated for mining. It should be noted that agricultural land in China is highly fragmented, for instance, previous surveys found that each household has on average around six plots of land scattered around the village (Ho, 2005; Tan et al., 2005). As expropriation is concentrated around the mining operational sites, households only lose part of their land to expropriation (and are thus also only partially compensated).

However, land subsidence did cause large-scale displacement and often entire villages had to be resettled. Among the 11 relocation villages, 83.6% of the respondents (n = 120) considered land subsidence in their original villages as ‘very severe’ and ‘severe’,¹⁵ indicating that they were relocated after visible and serious land subsidence. Two of the investigated villages were even relocated for a second time after the relocation village also became prone to mining damage. Also in the villages that had not been scheduled for resettlement, mining-induced subsidence was regarded as a serious problem. Among the 16 non-relocation villages we studied, 78.8% of the respondents (n = 110) considered land subsidence ‘very severe’ and ‘severe’ (see Fig. 3 and Fig. 4)

4.2. FPIC: involuntary or voluntary resettlement

The study found that villages residing at some distance, compared to those located nearest to mining companies, would be more likely to suffer from land subsidence. Mining companies would presumably withhold from extracting resources under their own buildings. Therefore, communities in the direct proximity of the mining companies' work environment would (temporarily) not be affected from land subsidence. However, it is more difficult for farmers living at some distance to the mines to predict whether or when they will be affected. They were unaware or not concerned about the mining until the damage to land and housing started to appear.

To gauge whether respondents felt involved in the displacement and resettlement schemes, we asked them about their willingness to be relocated. The majority (or, 68.7%, n = 110) of the respondents in the 16 non-relocated villages, actually hoped to be relocated. The remaining percentage of those who were not willing to be relocated showed concerns about inadequate compensation and expected their living costs to increase in the future. Over half (or, 54.2%, n = 120) of the respondents in the relocation villages were voluntarily relocated.

Amongst the 16 non-relocated villages that are subject to mining-induced land subsidence, only five were notified of a possible relocation, which had been postponed for two to three years due to delays in the construction of the new relocation villages. While awaiting relocation, most villagers had to find temporary accommodation themselves or stay in with relatives. In the remaining 11 villages that had not been relocated yet, affected farmers did not know when the relocation would take place, and were unaware where they would be relocated to.

Visible damage and a high willingness to be relocated were no

¹⁴ The proportion is set at 50% for the western and northeastern provinces, 40% for the central provinces, and 20% for the eastern coastal provinces.

¹⁵ A five-point Likert scale was used to measure the severity of land subsidence and house damage with 1 = negligible, 2 = alight, 3 = moderate, 4 = severe, and 5 = very severe.

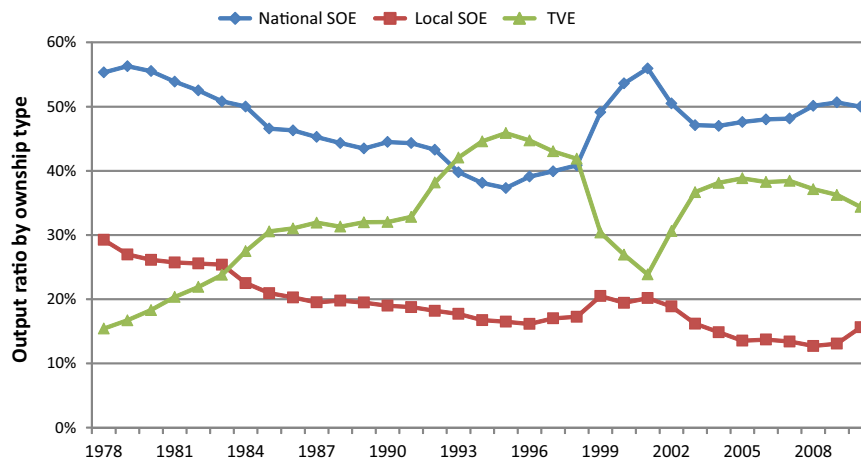


Fig. 2. Contribution of different types of enterprise to coal output (1978–2010).

Source: Zhongguo meitan gongye nianjian (Chinese coal industry yearbook), various years.



Fig. 3. Land subsidence in Laizibao village, Huayuan.

Source: Taken by authors



Fig. 4. A damaged house in Caizi village, Peixian.

Source: taken by authors

guarantee that farmers could be relocated. This study found that in the 11 relocated villages the average time to be reallocated was 6.3 years (SD = 3.6) after the first signs of damage. The lag in relocation has

triggered significant social tension. In 19 out of 27 surveyed villages collective complaints had been lodged through “letters and visits” (*xinfang*) or the Chinese petitioning system (Li and O’Brien, 1996; Michelson, 2007; Minzner, 2006). Of these, nine villages had resorted to the highest and final means of petitioning, and had lodged their complaint with the central authorities in Beijing. Nine villages (of which four were amongst the group that had lodged complaints in Beijing) also reported (violent) confrontations with mining companies, such as sit-ins, strikes, demonstrations and even destroying facilities and mining equipment. In one case (Shuozhou, Shanxi) protestation with the use of road blocks proved successful, and led to a prioritized relocation of a village after the provincial governor had paid an inspection visit (Zhou, 2013; Han, 2014).

4.3. Compensation: too low, too little

Affected farmers were compensated in two steps: first, they received compensation for the original house. Second, they were entitled to purchase a new house at the relocation village. The farmers could choose how to spend the compensation fee, for example, by buying a house in the urban areas or by using the fee to construct property themselves. In practice, buying a house in the city was constrained by household income, the rapid increase in urban housing prices, and employment opportunities. As a result, most households chose to be resettled at the relocation villages built by the local government. In these cases, the compensation was not paid to the household, but instead kept by the authorities.

Even when farmers were resettled in the relocation village, there was a substantial difference between the compensation for the original house and the purchasing price for new property. For example, in the surveyed villages in Shandong and Jiangsu Province, each household member was entitled to 30 m² floor area, regardless of the household size, which was compensated against 150 Yuan/m². In contrast, the price for new housing in the relocation village was more than 5 times higher, namely 760 Yuan/m². In Chongqing Municipality, each household received a flat compensation of 50,000 Yuan, regardless of household size, while the price for the new house at the relocation village was almost three times as high, namely 148,000 Yuan. Thus, in order to buy new housing, households had to use the entire compensation fee in addition to their own funds.

We also observed other sources for conflict about the locally determined compensation standards. Under the household based compensation scheme, elderly parents were not counted as a separate household, but as a single household with one of their sons (while daughters were not entitled to separate household



Fig. 5. Additional floor to increase compensation in Nanzhang village, Shandong.
Source: Taken by authors

status). This was the case, even if elderly parents lived independently from their son(s). Not entitled to compensation, elderly parents were sometimes forced to live with their male offspring. However, we discovered several instances, in Xiushan (Chongqing), and Binxian (Shaanxi), in which uncompensated elders were not welcomed by any of their sons. As a result, they were left behind, staying alone in oft dangerously damaged houses, while the rest of the village had been moved out.

Pressured by the low compensation, some households had built an additional floor on top of their original house in order to receive more (Fig. 5). It is a phenomenon that has also been reported elsewhere (Zong, 2012; Song et al., 2009).¹⁶ As a result, in certain areas in Shandong and Jiangsu, farmers were denied compensation in full for the newly built annexes. In response, local government also changed the criterion for compensation from an area-based to a flat-rate based on household size (the third method of calculation, as described in Section 3.3).

With regard to the new housing in the relocation village, less than half of the respondents (43.8%) expressed satisfaction about the building quality. From the interviews it was found that relocated farmers often complained that relocated houses had been poorly built and badly maintained, as various problems, such as water leakage, wall peeling and crack, were identified upon moving in. On a slightly positive note, the majority of respondents found basic infrastructure and utilities at the new living environment more convenient, including improved transportation (satisfaction rate 87.6%), electricity (satisfaction rate 90.1%), and tap water supply (satisfaction rate 72.7%). This can be explained by the fact that the relocation villages are mostly located on the outskirts of the township government seat. (Fig. 6)

Resettlement also had a negative effect on farming operation. The overall majority of respondents (93.9%) maintained that mining had adversely influenced the land productivity in the original village. Compensation for agricultural productivity loss was problematic. For instance, in Jiangsu Province, the compensation standard for land productivity loss was capped at a maximum level insufficient for the farmer (i.e. 750 yuan/mu/year, Jiangsu Provincial Government, 2004, p.1). In other places, such as a village in Xiushan, Chongqing, it was negotiated between the mining company and local farmers according to the degree of land productivity loss. The compensation was paid annually, but was at times delayed. At other places, such as a village in Shuozhou,

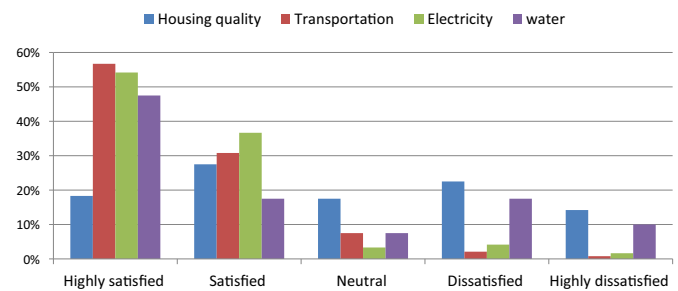


Fig. 6. Satisfaction with the living environment in relocation villages.

Source: This survey

Shanxi, the loss was not recognized by mining companies and farmers were granted no compensation.

Resettled farmers received no new land, but remained dependent on agricultural land in the original village. As the relocation villages were located at some distance from the original villages, farming had become more difficult, while many had difficulty in securing off-farm jobs. Farmers complained that they had to spend hours on foot to cultivate farmland in the original village. In consequence, some were forced to abandon the land, and instead rented farmland nearby the relocation village. Although not being landless farmers in the strict sense of the word, as respondents were still entitled to land, they often likened themselves to landless tenants in the “old, feudal society”; a socio-politically sensitive image, as it refers to the resurfacing of the cleavages and inequity of pre-Communist times.

Finally, there was also concern amongst the relocated respondents about the increased cost of living. Only 31.7% of the respondents stated that their household income had increased. In the relocation village, fees for water and gas were higher than what farmers paid in the original village, and virtually none of the respondents stated that the living expenses decreased. For 36.7% of the respondents monthly living expenses had “significantly increased”. As the compensation was mostly spent on the purchase of new housing, while agricultural productivity had been adversely affected and off-farm employment was limited, most farmers were deeply concerned that their livelihood on the medium or long term could not be maintained. Tellingly, a 60% of surveyed farmers expressed regret at having been relocated.

4.4. Liability: ‘Miner Pays Principle’ ineffective

As discussed in Section 3.4, the formal regulations in China stipulate that MIDR should be managed by the state, whilst being financed by the mining companies. We asked respondents who they thought should be financially responsible for relocation (Fig. 7). Only 5.2% of respondents themselves were willing to contribute to the relocation costs. Yet, in reality the displaced farmers had to make up for a large share of the resettlement costs.

Many farmers feel that it is the government that attracts and introduces mining companies, while the mining companies have handed the funds for relocation to the government. It is probably why approximately one third of respondents believe that the government should be liable for the cost of resettlement, while a similar amount of respondents believe that mining companies should take full responsibility.

The respondents were not aware of the source of relocation funding. In Xiushan, Chongqing, a government report on the source of funding was unexpectedly obtained. In this particular case, relocation funding was gathered from various departments, and through different sources: the Department of Land and Resources secured 2 million Yuan from the Golden Land Project (a national geological disaster prevention and relocation project) and 3.25 million from environmental recovery bonds; the County Development and Reform Council used 3.5 million

¹⁶ The same phenomenon has also been reported for urban development (Zhao and Webster, 2011; Lora-Wainwright, 2014).

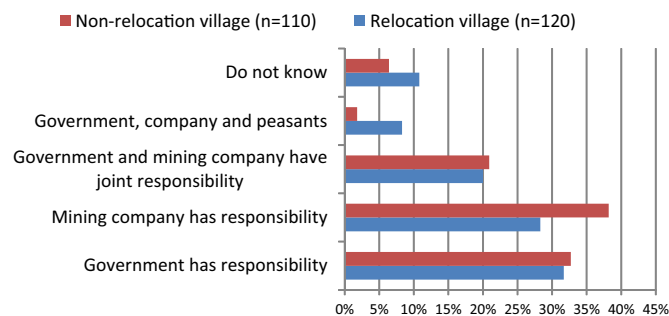


Fig. 7. Who ought to be financially responsible for the relocation cost?

Source: This survey.

from an ecological migrant fund; the Poverty Relief Office used 3.5 million from their poverty relief and relocation fund; and the county government was responsible for the remaining 3.5 million. Note that in this case, none of the compensation was provided by the mining companies involved.

5. Conclusion and discussion

Mining has displaced millions of farmers and has incited great tensions in Chinese rural society. This paper ascertained that the reasons for the large-scale mining-induced displacement and resettlement or MIDR are rooted in China's current institutional framework.

First, the present laws and regulations cater to open-pit mining, rather than dealing with underground mining. This creates serious problems, as land subsidence due to underground mining is a major cause of MIDR in China. Land subsidence leads to damaged housing and cropland, and has had great influence on farmers' daily life and livelihood. From our fieldwork and surveys conducted in different parts of the country, we found that land subsidence was perceived as a major issue by most respondents.

Second, national law on mining does not acknowledge the principles of Free, Prior and Informed Consent, not in the case of the mining itself or in the case of mining-induced resettlement. This was also supported through our empirical data. We found that a majority of the farmers was ill-informed about resettlement, whether, and if so, when it would take place. Uncertainty about the details of resettlement coupled with the ongoing and increasing mining-induced damage, led to significant disputes. In the 27 surveyed villages, it was found that 19 villages had lodged formal complaints to the local and central authorities, while nine had witnessed, at times violent, confrontations between farmers, mining companies and local government.

Third, to date there are no national standards that address compensation for mining-induced damage and resettlement, while local standards are either lacking, or set too low to compensate for actually incurred costs. The lack of national and local standards is reflected in our data. Relocation is often only used as a measure of first, and in fact, also *ultimate* resort by the local government and mining companies. In other words, little is done to compensate farmers unless damage has reached serious levels. What can be done

at that stage is little more than relocate the village. This is problematic on several accounts: i) resettled farmers have to purchase new housing in the relocation villages, and albeit subsidized, the price is significantly higher than the compensation they receive for their old house; ii) farmers are often not allocated new farmland in the relocated villages, but are dependent on their original land, which increases costs as farmers have to return to the original village for farming; iii) farmers have expressed great concerns for the rise in living costs, which apart from the aforementioned two factors, is also exacerbated by the scant opportunities for alternative and additional off-farm employment.

Four, there are insufficient stipulations on the liability of the state in the form of the Polluter Pays Principle. In the case of land subsidence by coal-mining, the company is responsible for the costs of relocation, while the (local) government is charged with the logistics of relocation. However, we believe that primarily holding the mining company liable might be insufficient to deal with the problem at hand, because of a triple reason:

- The magnitude of the problem, it was estimated that in Shanxi Province alone over 2 million people have been affected by mining-induced land subsidence (Zhang, 2013, p.94). With many more (and some densely populated) coal-producing provinces, such as Shaanxi, Shandong and Sichuan, this figure can be expected to be significantly higher, let alone, when accounting for other minerals mined under-ground (e.g. lead, zinc and manganese);
- The long term neglect of the problem, as only until 2003, was liability for coal-mining more clearly stipulated in national rules. This has not only led to the magnitude of the problem, it has also created a pervasive culture of 'mining first, cleaning up later';
- Damage by mining is not only caused by state-owned companies, but to a significant extent also by small mines owned and operated by villages and townships. Such mines lack the financial resources, technology, and capability to deal with the consequences of large-scale MIDR.

Due to the externalities caused by mining, the property rights debate regularly flares up, with opposing camps pleading to either privatize or nationalize mineral resources (Dobra and Newman, 2014; Leistritz and Voelker, 1975). China is oft seen as an outlier, with its state and collective land ownership, separated state-owned mineral resources, and lack of private land ownership. Therefore, there would presumably be all the more reason for a fundamental reform of the Chinese property rights structure.

Yet, when compared to other countries, China is actually not such an exceptional case in its land and mineral ownership. In effect, what becomes apparent with one glance at Table 3 is that what China lacks, is not so much a particular ownership structure of mineral resources, but a sufficiently effective, state-coordinated effort to compensate people affected by MIDR.

It is against this backdrop that we argue for a greater involvement from China's central authorities, not just in the distribution of liability between the central versus the local state, but also in a pro-active role in the establishment and administration of state compensation schemes and insurances.

Table 3

Ownership and compensation for selected mining countries.

Source: Drawn by Peter Ho based on (Hunt, 2001; Leistritz and Voelker, 1975; World Bank, 2011)

Country	Land ownership	Mineral ownership	Subsidence compensation (for coal only)
China	Central state and collective	State	<i>Ad hoc</i> negotiated with company
Australia	Crown and private	Crown	State Mine Subsidence Compensation Fund
United States	(Federal) state and private	Land owner (except for e.g. coal, phosphate, nitrate)	State Sponsored Mine Subsidence Insurance
United Kingdom	Crown and private	Land owner (except for e.g. gold and silver)	Coal Authority or individual company

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References

- Abuya, W.O., 2013. What is in a coconut? An ethnoecological analysis of mining, social displacement, vulnerability, and development in rural Kenya. *African Studies Quarterly*, 14(November), p.Jan-21. Available at: (<http://www.scopus.com/inward/record.url?Eid=2-s2.0-84893819674&partnerID=40&md5=f5420cfd71b575e46cfee3174f24d0ef>).
- ADB, 1998. ADB Handbook on Resettlement : a Guide to Good Practice, Available at: (http://adb.org/sites/default/files/pub/1998/Handbook_on_Resettlement.pdf).
- Ahmad, N., Lahiri-dutt, K., 2006. Engendering mining communities: examining the missing gender concerns in coal mining displacement and rehabilitation in India. *Gend., Technol. Dev.* 10 (3), 313–339. <http://dx.doi.org/10.1177/097185240601000302>, (Available at: <http://gtd.sagepub.com/cgi/doi/>).
- Andrews-Speed, P., et al., 2005. Economic responses to the closure of small-scale coal mines in Chongqing, China. *Resour. Policy* 30 (1), 39–54.
- Andrews-Speed, P., et al., 2003. The regulation of China's township and village coal mines: a study of complexity and ineffectiveness. *J. Clean. Prod.* 11 (2), 185–196.
- Bainton, N.A., Macintyre, M., 2013. "My Land, My Work": business Development and Large-Scale Mining in Papua New Guinea. Emerald Group Publishing Limited. <http://dx.doi.org/10.1108/S0190-1281%25282013%25290000033008>, (Available at: <http://www.emeraldinsight.com/doi/abs/>).
- Banks, G., 2013. Little by little, inch by inch: project expansion assessments in the Papua New Guinea mining industry. *Resour. Policy* 38 (4), 688–695, (Available at) (<http://www.sciencedirect.com/science/article/pii/S0301420713000160>).
- Bian, Z., et al., 2010. Environmental issues from coal mining and their solutions. *Min. Sci. Technol. (China)* 20 (2), 215–223.
- Cao, Xia, 2007. Regulating mine land reclamation in developing countries: the case of China. *Land Use Policy* 24, 472–483.
- Cernea, M.M., 2008. Compensation and benefit sharing: why resettlement policies and practices must be reformed. *Water Sci. Eng.* 1 (1), 89–120, (Available at) (<http://linkinghub.elsevier.com/retrieve/pii/S1674237015300211>).
- Cernea, M.M., 1997a. Impoverishment risks, risk management, and reconstruction: a model of population displacement and resettlement. *World Dev.* 25 (October), 1569–1597.
- Cernea, M., M., Mathur, H., M., 2008. Can compensation prevent impoverishment. Reforming resettlement through investments and benefit-sharing.
- Chan, N., 2003. Land acquisition compensation in China—problems and answers. *Int. Real. Estate Rev.* 6 (1), 136–152.
- Deng, X., et al., 2010. xuzhoushi caimeng taxiandi zhili guochengzhong ruogan wenti de xikao[thought on processing of mining Subsidized land treatment in Xuzhou]. *Coal Econ. Res.[meitan jingjin yanjiu]* 30 (7), 25–28.
- Diao, X., Yuan, Y., Zhang, C., 2006. jinshu kuangshan dizhi zaihai yanjiu fazhan qushi[Geological Disasters of Metal Mines and Trend in Their Research]. *Metal Mine*, (6), pp.1–4.
- Dobra, J., Newman, D., 2014. The case for private ownership of mineral rights, *Mining News*, 7 January Issue. at: (www.miningfacts.org/Blog/Mining-News/TheCase-for-Private-Ownership-of-Mineral-Rights), (accessed 8 August 2017).
- Downing, T.E., 2002. Avoiding new poverty: mining-induced displacement and resettlement" | NRC. *Min. Miner. Sustain. Dev.* (58), 1–29, (Available at: <http://naturalresourcecharter.org/content/downing-t-2002-avoiding-new-poverty-mining-induced-displacement-and-resettlement>).
- Guhan, S., 1994. Social security options for developing countries. *Int'l Lab. Rev.* 133, 35.
- Han, X., 2014. Go ahead with the coal mining land subsidence treatment [Pinluqu: zhashi tuijing caimei chenxianqu zhili gongzuo]. *Shanxi jingji ribao*. (Available at) (<http://jjsx.china.com.cn/lm642/2014/281371.htm>).
- Hanna, P., Vanclay, F., 2013. Human rights, indigenous peoples and the concept of free, prior and informed consent. *Impact Assess. Proj. Apprais.* 31 (2), 146–157. <http://dx.doi.org/10.1080/14615517.2013.780373>, (Available at: <http://www.tandfonline.com/doi/abs/>).
- Hegglund, G., 2006. Resettlement programmes and environmental capacity in the Three Gorges Dam Project. *Dev. Change* 37 (1), 179–199.
- Ho, Peter, 2013. In defense of endogenous, spontaneously ordered development: the institutional structure of China's rural urban property rights, *J. Peasant Stud.*, 40 (6), 1087–1118.
- Ho, P., 2016. An endogenous theory of property rights: opening the black box of institutions. *J. Peasant Stud.* 43 (6), 1121–1144.
- Ho, P., 2005. Institutions in transition: land ownership, property rights, and social conflict in China. Oxford University Press.
- Ho, P., 2014. The "Credibility Thesis" and its Application to Property Rights: (in)secure Land Tenure and Social Welfare in China. *Land Use Policy* 39 (3).
- Hunt, M.W., 2001. Mining Law in Western Australia Third edition. The Federation Press, Leichhardt.
- IFC, 2002. Handbook for Preparing Resettlement Action Plan, Washington, D.C.
- Jackson, S., Sleight, A., 2000. Resettlement for China's Three Gorges Dam: socio-economic impact and institutional tensions. *Communism Post-Communism Stud.* 33 (2), 223–241, (Available at) (<http://www.sciencedirect.com/science/article/B6VGF-401RX79-4/2/37555f5a799b278cd262ef356c50552a>).
- Jiangsu Provincial Government, 2004. Guanyu Diaozheng Meikuang Caimei Taxiandi Zhengqian Buchang Biaozhun de Tongzhi [Notice on adjusting compensation on requisition of mining-subsided land] 2004/6 (30-1-2004), Nanjing, Jiangsu.
- Leistriz, F.L., Voelker, W. Stanley, 1975. Coal Resource Ownership: Patterns, Problems, and Suggested Solutions. *Nat. Resour. J.* 15, 643–662.
- Li, L., O'Brien, K., 1996. Villagers and popular resistance in contemporary China. *Mod. China* 22 (1), 28–61.
- Li, P., 2014. kuangye yongdi zhuanzhang rufa husheng zaiqi[Call for regulating land used for mining]. *zhongguo kuangyebao*. (Available at) (http://www.mlr.gov.cn/xwdt/jrxw/201406/t20140626_1321853.htm).
- Lin, B., Liu, J., 2010. Estimating coal production peak and trends of coal imports in China. *Energy Policy* 38 (1), 512–519. <http://dx.doi.org/10.1016/j.enpol.2009.09.042>, (Available at: <http://dx.doi.org/10.1016/j.enpol.2009.09.042>).
- Liu, X., Meng, Q., Tang, M., 2006. Guanyu Wanshan Tanxiandi Zhegnong Zhidu de Sikao he Jianyi [Thought and Suggestion on Improving Institutions of Subsidized Land Acquisition]. *Shandong Guotu Ziyuan*, 22(3), pp.30–31.
- Liu, Y., 2015. Supporting Shanxi coal mining subsidized land treatment[zhichi shanxi kaizhan caimei chenxianqu zhili]. *Shanxi ribao*. Available at: (http://www.npc.gov.cn/npc/cdbdhy/12_3/2015-03/08/content_1914941.htm) (accessed 5 January 2017).
- Lora-Wainwright, A., 2014. Grassroots perspectives on relocation: threats and opportunities. *Positions* 22 (3), 661–689.
- Lu, S., 2002. Caimen Taxiandi Zhengyong Wenti Tantaot [Discussion on mining subsidized land acquisition]. *Turang*, 34(2), pp.109–110.
- Lu, J., Lora-Wainwright, A., 2014. Historicizing sustainable livelihoods: a pathways approach to lead mining in rural central China. *World Dev.* 62, 189–200.
- Madebwe, C., Madebwe, V., Mavusa, S., 2013. Involuntary displacement and resettlement to make way for diamond mining: the case of Chiadzwa villagers in Zimbabwe. *J. Res. Peach, Gend., Dev.* 1 (10), 292–301.
- Mathur, H.M., 2006. Resettling people displaced by development projects: some critical management issues. *Social. Change* 36 (1), 36–86.
- Michelson, E., 2007. Climbing the Dispute Pagoda: grievances and appeals to the official justice system in rural China. *Am. Sociol. Rev.* 72 (3), 459–485.
- Minzner, C.F., 2006. Xinfang: an alternative to formal Chinese legal institutions. *Stan. J. Int'l L.* 42, 103.
- MLR, 2013. kuangye yongdi zhengce quanjing jixie [Panorama view of land use for mining policy in China]. *zhongguo kuangyebao*.
- Morse, J.M., 2004. Theoretical saturation, in *Encyclopedia of Social Science Research Methods*, vol 3. eds. Michael Lewis-Beck, Alan Bryman, Tim F.T. Liao.: pp. 1122–1123.
- Nakawo, M., Konagaya, Y., Chimedyn, S., 2010. Ecological Migration: Environmental Policy in China. Peter Lang.
- National Bureau of Statistics of China, 2015. China Statistics Yearbook. China Statistics Press, Beijing.
- NDRC, 2004. Guojia Gazhangaigewei Guanyu Jiakuai Kaizhan Caimen Chenxianqu Zhili Gongzuo de Tongzhi [Accelerating to deal with coal mining subsidence], Document No. Faigaitouzi 2004/1126, China.
- Nor-Hisham, B.M.S., Ho, P., 2016. A conditional trinity as "no-go" against non-credible development? Resettlement, customary rights and Malaysia's Kelau Dam. *J. Peasant Stud.* 43 (6), 1177–1205.
- NPC, 2004. Tudi Guanli Fa [Land Administration Law of PRC], Beijing, China: falv chubanshe.
- NPC, 1996a. Zhonghua renmen gongheguo kuanchaziyuan fa [Mineral Resources Law of PRC], dizhi chubanshe.
- NPC, 1996b. Zhonghua Renmen Gongheguo Meitan Fa [Law on Coal], falv chubanshe.
- Owen, J.R., Kemp, D., 2016. Can planning safeguard against mining and resettlement risks? *J. Clean. Prod.* 133, 1227–1234. <http://dx.doi.org/10.1016/j.jclepro.2016.05.165>, (Available at: <http://dx.doi.org/>).
- Owen, J.R., Kemp, D., 2014. "Free prior and informed consent", social complexity and the mining industry: establishing a knowledge base. *Resour. Policy* 41, 91–100, (Available at) (<http://www.sciencedirect.com/science/article/pii/S0301420714000300>).
- Owen, J.R., Kemp, D., 2015. Mining-induced displacement and resettlement: a critical appraisal. *J. Clean. Prod.* 87, 478–488, (Available at) (<http://linkinghub.elsevier.com/retrieve/pii/S0959652614010269>).
- Pang, L., de Brauw, A., Rozelle, S., 2004. Working Until you drop: rural elderly in China. *China J.* 52 (52), 73–94.
- Rui, H., 2005. Development, transition and globalization in China's coal industry. *Dev. Change* 36 (4), 691–710.
- Shandong Provincial Government, 1989. Shandongsheng banqian yamei jianzhuwu zanxing guiding [interim regulation on relocating coal-buried buildings by Shandong Province] 1989/135 (08-Nov-1989), Jinan: Shandong.
- Shen, L., Andrews-Speed, P., 2001. Economic analysis of reform policies for small coal mines in China. *Resour. Policy* 27 (4), 247–254.
- Shen, L., Gunson, A.J., 2006. The role of artisanal and small-scale mining in China's economy. *J. Clean. Prod.* 14 (3–4), 427–435.
- Small, M.L., 2009. How many cases do I need? On science and the logic of case selection in field-based research. *Ethnography* no. 10, 5–38.
- Song, H., Tao, S., Xu, M., 2009. The study on involuntary resettlement of mining area [Kuangqu Feiziyuan Yimin Wenti Yanjiu]. *J. Liaoning Tech. Univ. (Social. Sci.)* (3).
- State Council, 2003a. China's Policy on Mineral Resources. GOV.CN. Available at: (<http://app.chinaminig.com.cn/focus/Law/2007-07-19/1184829390d6255.html>).
- State Council, 2003b. Dizhi Zaihai Fangzhi Tiaoli [Regulation on the Prevention and Control of Geologic Disasters], China: State Council.
- State Council, 1983. Guowuyuan Guanyu Jiasu Jieju Kuangqu Cunzhuanyamei he

- qiancun wenti de tongzhi [accelerating to solve the problem of mining coal under villages and village relocation]1983/10 (25-Jan-1983), China.
- State Council, 1980. Guowuyuan Guanyu jieju Kuangqu Cunzhuang Yamei he Banqian Gongzuo de Tongzhi [Notice on solving the problem of mining coal beneath villages and village relocation], 1980/174 (14-7-1980), Beijing: State Council.
- State Council, 2013. guowuyuan guanyu yinfa quanguo ziyuanxing chengshi kechixu fazhan guihua[Notice of the State Council on Issuing the Sustainable Development Plan of Resource-dependent Cities Nationwide (2013–2020)], China. Available at: (http://www.gov.cn/jzwgk/2013-12/03/content_2540070.htm).
- Sun, Y., Xiao, P., 2011. Wanshan Kuangyeyongdi Shiyongquan de Falu Shezhi[Improving Legal Institutions on mining land use rights]. Lilun Yuekan 6, 170–172.
- Szablowski, D., 2002. Mining, displacement and the World Bank: a case analysis of compania minera antamina's operations in Peru. *J. Bus. Ethics* 39 (3), 247–273.
- Tan, S., Futian, Q., Heerink, N.B.M., 2005. What drives land fragmentation? Theoretical approaches and empirical analysis. In *Developmental Dilemmas-land reform and institutional change in China*. Routledge, pp. 201–229.
- Tu, Jianjun, 2011. *Industrial Organization of the Chinese Coal Industry*, Program on Energy and Sustainable Development. Stanford University, 1–103.
- VanderKlippe, N., 2015. When a floating village falls to earth. *The Global and Mail*. Available at: (<http://www.theglobeandmail.com/news/world/when-a-floating-village-falls-to-earth/article25876178/>) (accessed 3 February 2016).
- Wang, E., 2007. zhongguo de mengkuang ziyuan[The resources of Chinese manganese ore]. *Dianchi Gongye* [Chinese Battery Industry], 3, p.10.
- Wang, P., et al., 2013. Compensation policy for displacement caused by dam construction in China: an institutional analysis. *Geoforum* 48, 1–9, (Available at)(<http://linkinghub.elsevier.com/retrieve/pii/S001671851300081X>).
- Wang, S., 2004. Coal mine safety production management: transition of China's management model[meikuang anquan shengchan jianguan: zhongguo zhili moshi de zhuanbian]. *Comp. Stud. (bijiao)* 13, 79–110.
- Wang, X. Yuan, W., 2013. kuangnong jiufeng jiqi jieju jizhi de fashehuixue fenxi[An Analysis of Disputes between the State-owned Coal Enterprises and Farmers and Settlement Mechanisms in Legal Sociology]. *Jiangsu shehui kexue*, (6).
- World Bank, 2001. Involuntary resettlement, OP 4.12, Washington, D.C.
- World Bank, 2008. China Coal Information Institute & Energy Sector Management Assistance Program(ESMAP). Economically, Socially and Environmentally Sustainable Coal Mining Sector in China.
- World Bank, 2011. Overview of State Ownership in the Global Minerals Industry: Long Term Trends and Future, Extractive Industries for Development Series Number 20, Washington D.C.: World Bank.
- Wright, T., 2006. The performance of China's industrial enterprises: a coal industry perspective. *China Inf.* 20, 165–199.
- Wu, X., et al., 2009. The influences of mining subsidence on the ecological environment and public infrastructure: a case study at the Haolaigou Iron Ore Mine in Baotou, China. *Environ. Earth Sci.* 59 (4), 803–810.
- Xinhua, 2015. Land subsidence caused by coal mining in Shanxi | thousand floating village will be relocated. [goodchinabrand.com](http://www.goodchinabrand.com/20343700070en.html). Available at: (<http://www.goodchinabrand.com/20343700070en.html>) (accessed 12 January 2016).
- Zhang, X.W., et al., 2011. Estimation of lead and zinc emissions from mineral exploitation based on characteristics of lead/zinc deposits in China. *Trans. Nonferrous Met. Soc. China (Engl. Ed.)* 21 (11), 2513–2519. [http://dx.doi.org/10.1016/S1003-6326\(11\)61044-3](http://dx.doi.org/10.1016/S1003-6326(11)61044-3), (Available at:[http://dx.doi.org/10.1016/S1003-6326\(11\)61044-3](http://dx.doi.org/10.1016/S1003-6326(11)61044-3)).
- Zhang, Y., 2013. Disaster reproduction and the crisis of governance—The Shanxi example in China's experience. *Rural China* 10 (1), 83–100.
- Zhao, X., Li, S., 2013. Survey and study of Restructuring harmonious regional Relations between mining industry and agriculture[Hexiequyue Kuangnong Guanxi Chonggou zhi Diaocha he yanjiu]. *J. Beijing City Univ.* 2, 5.
- Zhao, Y., Webster, C., 2011. Land Dispossession and enrichment in China's suburban villages. *Urban Stud.* 48 (3), 529–551. <http://dx.doi.org/10.1177/0042098010390238>, (Available at:<http://usj.sagepub.com/cgi/doi/10.1177/0042098010390238>).
- Zhou, J., 2013. Anti-official and anti-rich VS anti-civilian and anti-poor: when civilians can stand up? [chouguan chouhu yu choumin choupin: laobaixing heshi caineng zhanqilai?]. ifeng blog. Available at: (<http://blog.ifeng.com/article/30373012.html>) (accessed 9 January 2017).
- Zong, Y., 2012. Caimei Chenxianqu Yimin Anzhi Wenti Tantaof[On Resettlement Problem in Coal Mining Subsidence Area]. *China Coal*, 10, pp. 24–27.