

HAN YANG

Assessing the evolvments and impacts of environmental migration in Inner Mongolia

Blue, blue appear the skies; Vast, vast the grassland lies.
Winds blow, grass bows and we see the cattle roam.
Folk Song of Bei Dynasty (534-589 AD)

In the eyes of Chinese people, Inner Mongolia is an ecologically unique province that is knitted with double images. The shining side of Inner Mongolia attributes to its picturesque and endless grasslands. Yet, the dark facet of Inner Mongolia is notorious for being the source of dust storm sweeping over northern part of China. Due to climate change and excessive anthropogenic activities, environmental problems prevail in Inner Mongolia, including grassland degradation, sprawling deserts, water scarcity and soil erosion. In addition to environmental deterioration, poverty is prevalent for people living in environmentally undesirable areas. Worsening environment and aggravating poverty not only dismantle the tranquil lives of the indigenous people, but also require large-scale governmental interventions. Viewed as effective adaptation and mitigation measures to lift poverty and restore ecosystems, government-led resettlements have evolved from initially small-scale pilot projects to normatively mega-size strategic policies in Inner Mongolia.

This paper will first summarize environmental migration and associated policies that occurred before 2013. The following section will focus on the latest Environmental Migration and Poverty Eradication Planning enacted in April of 2013 by the Inner Mongolia provincial government. The new migration strategy will be reviewed and compared with previous measures. The next section will examine the economic, socio-cultural and environmental impacts induced by environmental migration through a combination of questionnaire surveys and a literature review. The paper will be concluded with a summary of the factors contributing to migration patterns and policies.

Information with is respects to subjective feelings and personal opinions on environmental migration are mainly collected from primary source, i.e. questionnaire-based surveys. The paper is complemented by secondary data searched from journals, newspapers and the Internet will be used to conduct qualitative and quantitative analysis. Incomplete and are inconsistent statistics, together with well as a lack of official and recognized data is a major challenge identified in this paper.

1. THE CONTEXT OF INNER MONGOLIA

1.1. Introduction on Inner Mongolia

Inner Mongolia is the third largest province in China, accounting for 12 percent of China's total land area. Stretching from the northwest to the northeast of China, the geographic location of Inner Mongolia is of significant importance because of its proximity to Beijing and borders with Mongolia and Russia. Inner Mongolia is one of

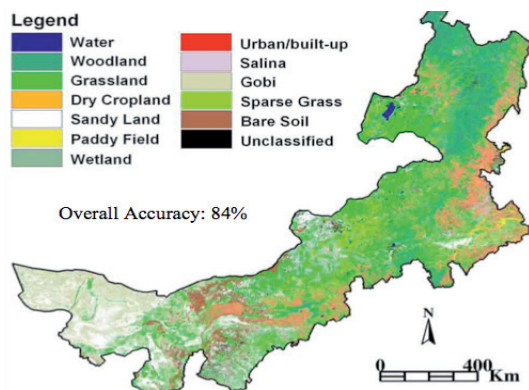
the five autonomous regions of China due to large concentrations of ethnic populations, particularly the Mongols. While Inner Mongolia is home to 68.72% of the total Mongols in China, the Mongols only make up 17% of total population within Inner Mongolia. There are other ethnic groups residing in Inner Mongolia, for example Manchu and Evenki. Along with Mandarin, Mongolian is used as the second official language.

Inner Mongolia is known for its picturesque scenery, indigenous culture and peaceful lifestyle. In addition to vast coverage of grasslands, there is large variety of land types in Inner Mongolia. According to 2013 Inner Mongolia Chronicles, Inner Mongolia consists of 59.86% grassland, 16.4% forest, 7.32% cultivated land and 13.85% barren lands; consisting of sands, Gobi desert and gravels). The map of land cover map is shown in Figure 1. The abundance of grassland fosters the long-lasting tradition of herding and nomadic lifestyle of the Mongols and other ethnicities inhabiting in Inner Mongolia. Some Mongols and the Evenkis living in mountain areas also depend on forestry and hunting for subsistence. The huge reserves of coal, natural gas and rare earth proliferates the surge of extractive industry in Inner Mongolia, which exerts immense economic, social and environmental effects. Due to the vastness and diversities of the territory, weather conditions are varying dramatically from the forested and mountainous region of the east to the sand covered and desert area of the west. Due to low precipitation, the majority of Inner Mongolia is under semi-arid or arid climates except for small semi-humid areas in the far Northeastern region (Figure 2).

1.2. Environmental problems in Inner Mongolia

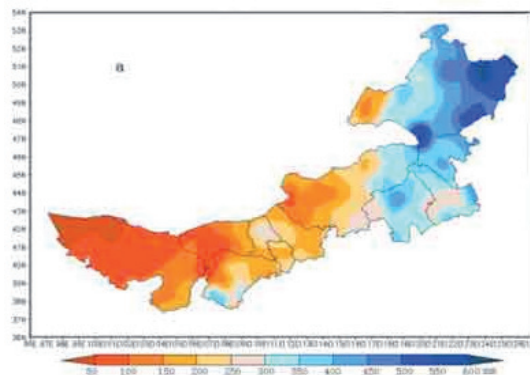
Inner Mongolia’s susceptibility to environmental disruptions partially stems from its inherent climatic and geographic constraints of being dry, arid and landlocked. As presented in Figure 3, the majority of Inner Mongolia lies in No.1 and NO. 2 Ecologically Fragile Zones, meaning the ecosystem is not resistant to external disturbances and sensitive to population pressure and therefore has low capacity to support human settlement (Tan 2008). Aside from natural conditions, to large extent the speed and scale of environmental deterioration in Inner Mongolia is due to excessive human activities that exceed the carrying capacities of ecosystem. In recent decades Inner Mongolia face a wide range of environmental problems, among which desertification, rangeland degradation, soil erosion, drought and water scarcity are extremely detrimental.

Figure 1. Land Cover Map of Inner Mongolia



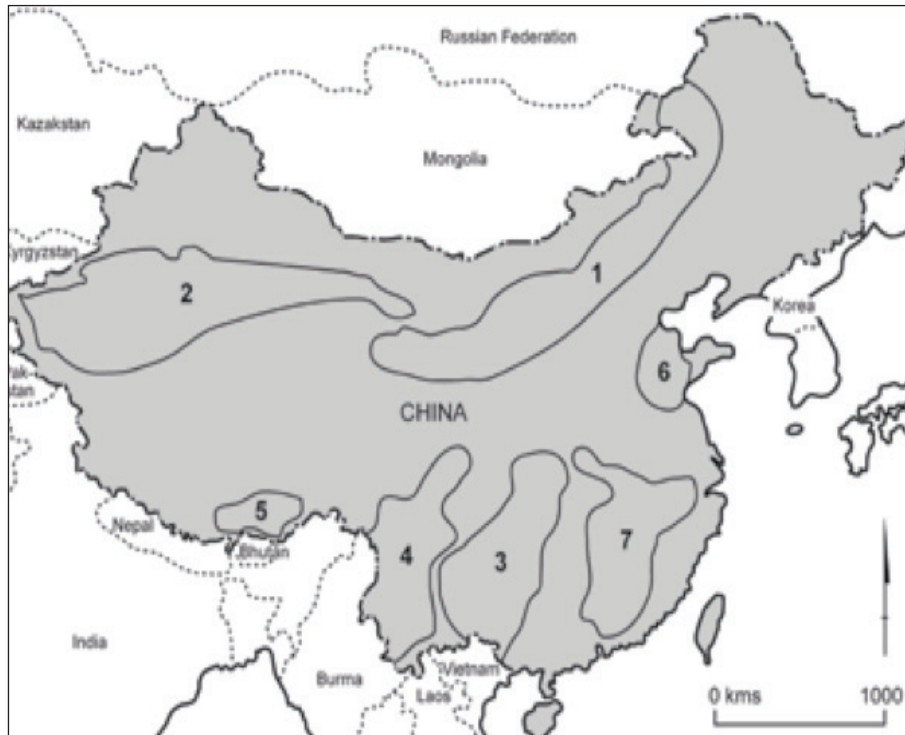
Source: Bagan & Yamagata 2009

Figure 2. Level of Precipitation in Inner Mongolia



Source: Meteorological Bureau of Inner Mongolia 2014

Figure 3. Distribution of Ecologically Fragile Zones in China



1. : Semi-arid and semi-humid areas in northern China. 2: Semi-arid areas in northwestern China)
Source: Tan & Fei 2007

Inner Mongolia has been plagued by prolonged drought and water depletion in recent decades. Since the 1980s, the number of dry days per year has significantly increased. The 21st century has witnessed a rapid surge of dry weather spells in Inner Mongolia. 2005 has been recorded as the driest year in the past 50 years (Wang & Wu 2013). Population growth and economic development has resulted in soaring water consumption and overexploitation of water resources. Those problems lead to many consequences including dropped river runoffs, shrank lakes and declined underground water levels. The interplay of the ecosystem and water-related issues in return give rise to a series of other environmental problems, including soil erosion and land degradation.

Both the size and gravity of desertification of Inner Mongolia are the highest among all Chinese provinces. Since the 1990s, desertification has incrementally progressed throughout in Inner Mongolia. On average, desertification expands at the speed of 2,460 km²/year (Liu & Zhao 2009). Up to the end of 2009, 52.2% of Inner Mongolia's territory has been considered as desertification, amounting to 6,177,700 km² Forestry Bureau of Inner Mongolia 2011. Desertification and soil erosion have resulted in frequent dust storms, hazarding local economy, daily livelihoods and public health. Based on historical records, there was, on average, one big dust storm (10.8m/s ≤wind speed ≤ 24.4m/s, 200m ≤visibility≤ 500m) every three decades in the 2000-year time frame prior to 1949. Between 1950 and 1990, the frequency of large dust storms increased to once biennially. In the 1990s, Inner Mongolia and other cities experienced dust storms on yearly basis (Yi & Zhang 2011). Furthermore, extreme dust storms have extended to the entire northern China affecting up to 12 cities and provinces. Dust storms blew away loose sands and fine soil particles from

Inner Mongolia, and 45.2% of those sands and soils were transported to Beijing and Tianjin, two of the most important and vibrant cities in China (Wang & Wu 2013). Dust storms produced from Inner Mongolia even transcended national territory reaching Japan and the Korean Peninsula. Yellow and dusty sky in Beijing was broadcasted worldwide, which partially triggered large-scale movements to curb dust storms and restore ecosystems in Inner Mongolia. Among various measures, relocating populations living in impoverished, fragile and harsh environments are widely used and highlighted by central, provincial and local governments. Environmental relocation and resettlement in China refers to moving populations inhabiting in ecologically fragile regions into areas with preferable environmental conditions (Wang 2013).

2. HISTORY OF ENVIRONMENTAL MIGRATION IN INNER MONGOLIA

2.1. Evolvement of environmental migration in Inner Mongolia

Historically, population movements between Inner Mongolia and the rest parts of China feature in inflows of Han Chinese from mainland cities to Inner Mongolia. As early as the Mongol-established Yuan Dynasty (1271-1368), thousands of Han people have been relocated to Inner Mongolia to take up farming according to History of Yuan. Immigration to Inner Mongolia increased again after the birth of new China for purposes of reclaiming the lands and building a new Inner Mongolia. At the onset of 2000, the Chinese Central Government's West Development strategy marked a new wave of immigration of Han people into Inner Mongolia (NDRC, 2000).

In contrast, the mobility of Inner Mongolia natives to other cities and provinces is less dynamic due to their unique lifestyle and reliance on pastures. However, the equilibrium has dramatically changed following the implementation of regional environmental migration projects.

The start of environmental migration in Inner Mongolia was mainly driven by rampant dust storms. At the turning point of the new millennium, Beijing and its adjacent regions were periodically attacked by dust storms blown from Inner Mongolia. Dust storms went beyond domestic concerns, and were put in the international spotlight because of 2008 Beijing Olympics Game. In 1998, the China State Council approved a "National Environmental Development and Plan" that required provinces located in the source zones of dust storms to strengthen environmental protections (The State Council 1998). The plan urgently requested limiting agricultural and grazing activities for the sake of restoring grasslands, forests and vegetation. In this context, Inner Mongolia government conceived and conceptualized the idea of environmental migration at the end of the 1990s. This prototype of future large-scale migration was initiated as small-scale pilot project. In 1998, Inner Mongolia embarked its first ecological emigration project with the intents to mitigate anthropogenic stress of the ecological systems in Yin Mountain. This 100-million yuan (16 million USD) project aimed at resettling 15, 000 people in three years (Chu & Meng 2006).

In May of 2001, the Inner Mongolia Provincial Government enacted 'Opinions On Implementing Environmental Migration and Poverty Alleviation Migration Projects', which initiated massive environmental migration in Inner Mongolia (IMDR, 2001). Aligned with National 10th Five-Year Plan, this regulation included a 6-year migration plan to relocate and resettle 650, 000 people of environmentally fragile areas and who were afflicted by desertification, grassland degradation and soil and water erosions. It also required governments of all municipalities (leagues) and counties (banners) to draw up concrete and specific regional migration schemes. Inner Mongolia further reinforced its ecological reinstatement and migration efforts in 2002 in response to the Beijing-Tianjin Sand Source Control Project, in which Inner Mongolia was a

major targeted region. In 2003, the “Grain for Green” resettlement swept across all of the Inner Mongolia administrative districts and prefectures affecting all 12 municipalities (leagues), 65 counties (banners), 101 towns and 2,412 villages. By the end of 2003, environmental settlers in Inner Mongolia had reached up to 290, 000 (Chu & Meng 2005).

In 2006, Inner Mongolia disclosed its Provincial 11th Five-Year Plan on Ecological Protection and Development (2006-2010). Significant attention and priority are given to rehabilitate ecosystems by re-vegetation, reforestation and re-plantation of farmlands and rangelands. Accordingly, the Provincial Five-Year plan spurred intensified environmental migration within Inner Mongolia. Between 2006 and 2010, Inner Mongolia has resettled in total 304, 000 environmentally displaced people.

In 2011, the Provincial 12th Five-Year on Ecological Protection Development Plan was launched to achieve ecological reinstatement by increasing forest and grassland coverage and alleviating grassland degradation. Strengthening environmental migration in pastures and forest areas are still defined as essential and effective measures in the Five-Year plan.

In 2013, the Inner Mongolia Provincial government rearticulated environmental resettlement policies by the enforcement of the ‘Environmental Migration and Poverty Eradication Plans for Ecologically Fragile Zones’. This ambitious 5-year plan set the goals of moving 366, 842 people of 115, 724 households, out of environmentally vulnerable areas. Apart from adaptation to environmental degradation, Inner Mongolia’s environment-induced resettlement has been integrated with poverty reduction measures since its naissance. The government’s decision of incorporating poverty alleviation into migration schemes is based on the coincidence that the majority of the under-poverty-line population inhabits in environmentally undesirable and vulnerable areas. It is worthy to note that a significant portion of the affected populations are ethnic minorities, namely the Mongols who are distinguishably different with Han Chinese in term of lifestyle, culture, religion and language.

2.2. Official discourse of 2013 Environmental Migration Plan

Governance in China is, by and large, still characterized by top-down, command and control approaches, which indicates polices and plans are usually drawn at top levels. National policies are the most important signals for lower-level governments to follow up with detailed and correspondent action plans. Despite of the fact that Inner Mongolia has accumulated more than decade’s environmental resettlement experience at provincial level, there are only two provincial official documents specific to environmental migration. Usually environmental migration is encompassed and merged in other national and provincial polices such as Beijing-Tianjing Sand Control and the Provincial Five-year Plan.

In addition to the 2001 version “Opinions on Implementing Environmental Migration and Poverty Alleviation Migration Projects”, the latest provincial document is “Environmental Migration and Poverty Eradication Plans for Ecologically Fragile Zones” (hereafter referred to as the 2013 Plan) that took into effect in April of 2013 (IMDR, 2013). The 2013 Plan is the core guidance within the policy framework of environmental migration in Inner Mongolia. In order to understand further on the rationales behind Provincial Government’s policy-making, the following subsections will review and summarize core components of 2013 Plan.

The necessity of environmental migration

The 2013 plan summarizes the achievements of previous migration projects and recognizes the contribution of environmental migration in terms of livelihood improvement and food security. It also reminds governments of all levels within to have “sober and clear understanding” that Inner Mongolia is still a less developed province represented by low-level, unbalanced and uneven socio-economic development

(IMDR, 2013). 1.97 million people in Inner Mongolia live under the poverty line, but measures such as bolstering industries, labor force transferring and social relief are only able to alleviate the situations for a limited numbers of the population. Those conventional poverty reduction measures are unable to benefit people dwelling in deserts, mountains and desertification zones. In this regard, the provincial government believes that environmental resettlement surpasses other conventional measures because it is able to embrace ecological rehabilitation, livelihood improvement and poverty reduction into one policy set.

Feasibility of environmental migration

The Inner Mongolia Provincial Government asserts that Inner Mongolia enjoys many opportunities and advantages, which have paved the foundations for carrying out environmental migration. Firstly, the Provincial Government has demonstrated strong political will and financial support to prioritize environmental and poverty-reduction related migrations. Secondly, local people reveal desires of relocation for the sake of better lives and higher incomes. Additionally, Inner Mongolia has accumulated rich migration experiences since 1980s concerning methodologies, resettlement design, project management and fundraising. The existing policies and solutions are highly helpful for future migration work. Besides, Inner Mongolia teems with vast land and rich natural resources that enable to resettle migrants within the territory of Inner Mongolia. Last but not least, Inner Mongolia's progresses on GDP growth, fiscal capacities, public service and industrialization enhance the feasibility of large-scale migration projects.

Fundamental principles

The 2013 Plan requires governments under provincial levels to outline sub-regional schemes and implementations in strict accordance with six fundamental principles, which are clearly stipulated in the Plan:

- i. Integrated and step-by-step implementation built on scientific research and close examination of local conditions.
- ii. Government-led, participatory and voluntary approach. Preconditioning on voluntary basis, government takes lead in designing, coordinating and organizing migration. Relevant agencies, social groups, private sectors and other civil society organizations are encouraged to collaborate to support and participate in migration and poverty reduction.
- iii. Be flexible, adaptable and innovative. Resettlement arrangements should be set according to local conditions and backgrounds of affected groups.
- iv. Oriented towards income boosting and resilience promotion.
- v. Be integrated, practical and efficient. Resources of various types must be mobilized and integrated to solve most pressing issues.
- vi. Environmental protection and sustainable development should be pivotal components. Released lands in origin areas must be reclaimed for the purposes of ecosystem restoration and suppressing environmental deterioration.

Major objectives

The 2013 Plan spells out the objectives of new-round environmental migration projects in Inner Mongolia in the aspects of scale of migration, timeframe and social-economic goals. Between 2013 and 2017, the migration project aims to relocate 115, 724 households and 366, 842 individuals living in environmentally fragile agro-pastoral zones. This migration plan will be applied to all 12 municipals and leagues. Environmental migrants should be resettled into new destinations (towns and villages) that belong to the same administrative divisions with the areas of origin.

All migration projects will finish at the end of 2017, with the goal of improving lives of environmental migrants. Specialized farming and livestock raising will be

the fundamental economic activities for sustaining subsistence and eradicating poverty. Supplementary but important sources of income will be transferring the existing labor force (mainly farmers and herders) to waged and contract workers. Ultimately, the goal set for the end of 2020 is launching into a moderately well-off society (or *Xiaokang Society*, referring to Chinese national economic policies to build up a society where people are moderately well-off and middle class), where migrants' incomes and public service will reach or above provincial average.

Criteria for the identification of areas of origin and of destination

Table 1. Criteria of Areas of Origins and Destinations

	Areas of Origin	Areas of Destinations
Economic Factors	-Places with higher density of under-poverty-line households -Places with poor transportation and scatter population that engender high costs for infrastructure and public service development	-Places with developed industries and promising job opportunities. -Industrial and manufactory bases and zones
Environmental Factor	-Places unable to feed local population due to imbalanced ecosystem, repeated droughts, water shortage and meager resources -Areas with frequent geological and natural disasters	-Places with adequate lands and water resources that are convenient for large-scale and centralized development.
Social Factor		-Easy access to work, school, medical care and water supply. -Places are flexible and capable to be annexed and expanded.

Financial schemes

The Inner Mongolia Provincial Government only allocates and provides subsidies for migrants house construction (15, 000 yuan /per person). Governments below provincial levels are responsible for fundraising for other new constructions and investments.

Settlement schemes

Migrants will be further detailed to two sub-groups, i.e. eco-migrants and labor-oriented migrants. The eco-migrants will be entitled with farmlands, while the labor-oriented migrants will lose their lands, relying mainly on waged and contracted work. There are two types of resettlement schemes: collective relocation and scatter relocation. Collective relocation refers to the resettlement of the entire village or community to the same destination without breaking down the former social constitutes. Scatter settlement will disperse migrants of the same origin to separated places. Groups with special needs, for instance single seniors and disabled persons will be assigned to public nursing and care homes upon permission or if needed.

3. ASSESSMENTS ON THE 2013 ENVIRONMENTAL MIGRATION PLAN

3.1. Progresses and Innovation in the 2013 Plan

Starting from the end of 20th Century, environmental migration has been favored by the Inner Mongolia Provincial Governments as a strategy to terminate environmental degradation and improve living standards. Although the virtual components

remain intact, Provincial Governments have upgraded and updated a number of details in its latest 2013 Plan. In comparison with 2001 version, 2013 Plan evolves to be more explicit, specific and inclusive.

Diversified Financing Mechanisms

Among various interventions to tackle environmental deterioration, environmental migration is one of the most expensive solutions that require tremendous capital investments. According to government, 2013 environmental migration will require an 18.98 billion yuan (3.96 billion USD) to construct new houses, develop irrigation and water systems, upscale public service and infrastructures, and the like. The 2013 Plan diversifies and expands sources of finance in many ways. First and foremost, Inner Mongolia Provincial Governments will apply for special grants from the National Development and Reform Commission and Ministry of Finance. Additionally, Provincial Governments will raise money from various sectoral funds or funds of special purposes, for example the Rural Drinking Water Safety Fund, Grain for Green Fund, Farmer Training Fund, Fund of Ethnicity Development, and so on. At the provincial and prefectural levels, complementary and diversified financing methods such as donations and private sponsor are highly recommended.

Encouragement of Wide Public Participation

One of the major progresses in 2013 Plan is calling for wide-ranged contributions and engagements from public sector, private sector and civil society organizations. Prominently, the role of the private sector is reiterated in the 2013 Plan. Business and enterprises are encouraged to be involved in research and provide recommendations in regards to poverty reduction. Along with governmental agencies and social groups, private actors, particularly state-owned companies and renowned local industries can partner with migrant villages to offer necessary assistance. Governments are required to strengthen cooperation and communication with private sector to ensure employments of migrants. Inner Mongolia also finds creative ways to incentivize engagements of private sectors. For example individual sponsors who donate 0.5 million yuan or above, and enterprise sponsors donate 1 million yuan or above will be endowed with naming rights, which means that the new villages or buildings can be named after individual contributors or enterprise.

Measures To Empower Migrants and Increase Self-Resilience

Highlighting the role of empowerment is an innovative addition to the 2013 Plan. This new environmental migration principle aims to enhance the resilience and development capacities of migrants. Governments will activate resources to reinforce the provision of practical trainings on farming, livestock breeding and other vocation skills to affected migrants. Vocational schools are also encouraged to admit more migrants.

Creation Of Special Inspection and Supervision Team

The implementation of environmental migration relies on cooperation and compliance of governments below provincial level, who may deviate from the roadmaps designed by the Provincial Governments. The new version of 2013 Plan has realized the importance of regular and continuous assessment on the performance of lower governments. Therefore the Provincial Government creates an inspection and supervision team represented by the Provincial Party Commission, Provincial Bureau of Agriculture and Animal Husbandry, Provincial Reform and Development Commission and Provincial Office of Poverty Alleviation. This team will regularly inspect the process of migration and poverty reduction, assess and validate all related work at the end of each year. Based on the results of the annual assessment, tasks and budget allocation for the following year may be subject to adjustment.

Stricter Management and Supervision on Funds

Environmental migration involves 18.98 billions yuan budget, which is an enormous number and also directly affects the lives and well-beings of migrants. The Inner Mongolia government tightens its control on fund management to prevent misappropriation, delay, suspension and other unwarranted uses. The budgets allocated for environmental migration will be managed and audited in special accounts to guarantee that all of the funds are used for their intended purposes.

3.2. Impact Assessments of Environmental Migration

The complexity and magnitude of environmental migration, in conjunction with the unique social contexts of Inner Mongolia affect the society, economy, environment and indigenous people in many different aspects. In order to collect recent first-hand opinions from migrants, affected groups and other residents in Inner Mongolia, questionnaires were designed and distributed to collect qualitative information from the ground (Figure 4). In total, nine responses were collected from Inner Mongolia. Among those 9 responses, two respondents are migrants who experienced resettlement by themselves. The others are Inner Mongolia residents or environmental engineers who are aware of the problems and benefits involved in environmental migration. Considering the huge scale of previous and ongoing environmental migration, the survey samples collected are inadequate to depict a complete picture on the overall impacts. In order to overcome this limitation, I selected 2 case study sites based on two migrants' current residencies in Darhan Muminghan and Urad Zhongqi, as well as the third case study in Wansheng village because of the availability of background information. The locations of the three case study sites are shown in Figure 5.

The assessments were conducted by examining pre- and post-changes occurred in economic, social and environmental pillars. The information provided by Darhan Muminghan and Urad Zhongqi was used for economic impact assessments. Socio-cultural impact was carried out for Wansheng village. Environmental assessments were applied to the entire Inner Mongolian region, complemented with limited volume of information gathered from questionnaires. The structure of impact assessment is in Figure 6.

Figure 4. Samples of Collected Questionnaires

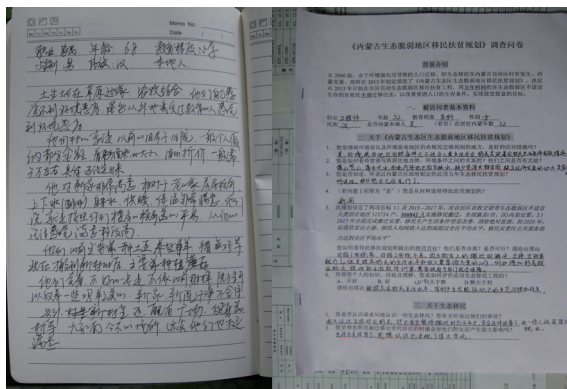
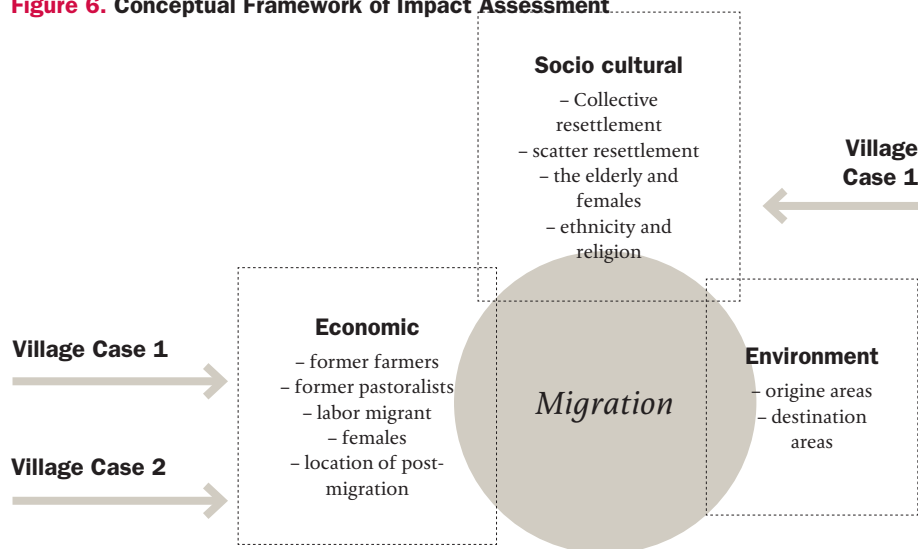


Figure 5. Location of the Three Cast Study Sites



Figure 6. Conceptual Framework of Impact Assessment



Source: Author, 2014.

3.1 Economic Impacts

Binding environmental rehabilitation with poverty reduction, environmental migration in Inner Mongolia takes place along with labor force transferring and structural adjustments that will bring about fundamental economic changes. Before migration, traditional farming and nomadic herding constitute major economic activities and income sources for both herders and rural residents. Following the enactment of Grain for Green Project and environmental migration projects, the extent and scale of farming and grazing are strictly tightened. Limited by decreasing farmlands, cash crops and high-yield agricultural productions are favored by local governments to achieve income-boosting goals. Former herders assigned little or no farmlands after migration are incentivized to breed caged livestock or transform to farmers and workers. Due to the scarcity and low-quality of farmlands, considerate amounts of former farmers and former herders are converted to labor workers relying on employments in adjacent cities or industrial zones. Changes in production practice have resulted in diverse impacts influenced by wide range of factors, including profession (famer or herder) before migration, ethnicities, genders and ages. In view of dissimilarities, it is unwise to generalize migration-induced economic impacts. Case-by-case and village-by-village study is more appropriate to analyze economic changes at lower levels focusing on affected individuals.

Dasheng village in Urad Zhongqi is a migrant settlement where residents have been relocated from the periphery of degraded grasslands and drying farmlands. Before migration, they were wither farmers or nomadic herders. After migrating to Dasheng village, villagers mainly depend on sunflowers and corn growing. Sunflowers are cash-generating crops for trading in markets, and corns are used to produce food. The average household income is 30,000 yuan per year for migrants, which is 3 times higher than their 10,000 yuan average annual income before migration. Similar changes are taking place in Darhan Muminggan migrant village where each household is provided with, on average, 1.3 hectares of farmlands. Prior to migration, the average annual household income produced from farming is below 10,000 yuan as opposed to a post-migration's 25,000 yuan annual income made from crop growing. But this positive change only occurs for migrants who are used to be farmers before migration.

It is crucial to clarify that income variation is different between former farmers and former herders who are currently living in the same places in Darhan Muminggan. After migration, it is impossible for former pastoralists to continue their herding life. Instead, they are allotted with farmlands and encouraged to raise caged animals. Migrant families, who lived on herding prior to migration, experience the drops of average annual income, from 40,000 yuan to 10,000 yuan after migration. Lacking in skills and experience in raising caged cattle or farming are considered as major reason of former herders' post-migration economic retrogress according to answers from questionnaires.

In addition to cash crop-based farming and husbandry, employments produced from factories and big farms are officially identified as important means to generate additional incomes. However, the reality is that migrant villages in Darhan Muminggan are not very close to big factories, consequently only a small amount of male migrants manage to find jobs in factories. Most migrants live on sheep raising or occasionally employed by big farms to grow potatoes or shear sheep. In migrant village of Darhan Muminggan, income from employment only accounts for 7,000 yuan household/year. In comparison, employment revenue contributes greater to annual income in Urad Zhongqi that equals to 15,000 to 20,000 yuan household/year. The gap of the salary-based income in two case studies arises from proximity to factories and big farms. Migrant villages in Urad Zhongqi have easy access to big industrial parks, and thus half of migrants, irrespective of gender, are eligible to be hired as workers to expand their incomes. Summary of income changes is listed in Table 2 Comparison of Incomes Before and After Migration (Author 2014).

Table 2. Comparison of Incomes Before and After Migration

Cast Study Sites	Pre-migration	Post-migration			Income Change	
	Economic activity	Income	Farming	Livestock Raising		Employment
Urad zhongqi	Farming	10000	30000		15000-20000	Increase
	Pastor herding	-	-	-	-	-
Darhan Mिंगgan	Farming	<10000	25000		7000	Increase
	Pastor herding	40000		10000		Decrease

Income : yuan,

It is worthy to point out that there are gender and ethnicity disparities with respects to employment opportunities. In Darhan Muminggan, only a minority of males succeeds in finding jobs in adjacent industries due to limited vacancies. Instead, both female and males can easily find employment opportunities in nearby factories and farms for Urad Zhongqi migrant village residents. Additionally, former ethnic pastoralists face more difficulties to be hired as contracted worker due to language barrier. Most of former nomadic pastoralists speak only Mongolia dialects and have poor command of mandarin.

Unequal income changes and surging living expenses are common difficulties for all migrants. As described in the questionnaires that those migrants are used to lead a simple but self-sufficient life. Overwhelming majority of them are originally from rural villages and grasslands. Farming, herding and other agricultural productions were inexpensive in the past because there is no need to buy commercial inputs or livelihood materials. After migration, the costs of fertilizers, seeds, irrigation, foddors and other inputs for farming and husbandry are significantly higher. Former nomadic herders, after migration, have to spend extra money to build animal shelters for caged livestock breeding. In migrants' former residential villages, they never

pay for water bills because they dig water from wells or use village-owned free water facilities. However, centralized water supply system in new migrant villages adds up water and electricity expenses.

3.2. Socio-cultural Impacts

Socio-cultural impacts in terms of social networks, community culture and rituals are analyzed by using case study site of Wansheng village. The assessments aim for examining changes with respects to social networks, community culture, rituals and sense of self-identity.

Wansheng migrant village is a new settlement specially built for migrants from two Daqing Shan mountainous villages: Wan Jiagou and Zhang Fangtang, with a small number of villagers relocated from other villages. Majority of those migrants are Han Chinese who have predominately resided in the mountain for generations, but are forced to leave their homelands due to the reforestation and conservation of Daqing Shan Mountain. When living in mountainous areas, they relied on subsistence family farming. Migration scheme in Wanjiagou is collective relocation that all households are moved to the same host village, while Zhang Fangtang resettlement is in a scatter scheme where villagers are relocated to different destinations., Similar with former herders of Darhan Minggan migration village, migrants in Wansheng settlement complain about declining income in the wake of migration.

Pre-migration, former villagers from Wang Jiagou lived in a very traditional and Chinese manner. The village played the role of a big family where people were closely tied together through well-developed social networks. Each villager and household contributed valuable social capital for other members in provision of emotional bonding, moral support, financial and labor assistance etc. Those intimate connections partially resulted from its isolated location in mountain, but more importantly community spirit and mutual-help are the essences of culture and tradition for rural Han Chinese. Following collective resettlement to Wansheng village, most villagers think their previous social networks continue in new village. Specifically, many villagers feel closer bonds with others as a result of declined income and lifestyle changes. With rigid disposal of income and financial capitals, some villagers attach higher reliance and expectation for financial and physical help from other villagers. In the transition from traditional farming to livestock raising, more frequently villagers resort to neighbors and other villagers for help in terms of knowledge and new skills exchange. For majority of migrants from Wang Jiagou, inter-community relationship are well maintained and even strengthened. Equally important, inter-personal networks and kinships outside migrant village are also enhanced. Because the new village is close to major roads and railways, and thus it is more convenient and less dangerous for migrants to visit relatives and friends living in other places, and vice versa.

The fact that Wansheng village is a mixed settlement housing migrants from various origins proposes both challenges and opportunities concerning social networks. 1 respondent described in the questionnaire that he and his community are not well acquainted with neighbors moved form different origins. They have no chance to improve relationships with other residents due to limited leisure time and public events. The fragmentation of the origins of the migrants and lacking in communication in Wansheng village causes unpleasant feelings and unfriendly atmosphere for some villagers. Interestingly, a interviewee reported different opinions regarding to social network changes. He wrote in the questionnaire that some migrants try to expand their networks by interacting with new neighbors, hoping to learn different life experience and skills.

Elderly villagers face bigger difficulties of adapting to the new life and environment. Lacking in familiarity and attachment with new village can lead to feelings of insecurity. In comparison with their former homes in mountains, the new village is not only bigger in size but also more interactive with the outside world. Therefore,

some old villagers are skeptical of strangers, visitors and vendors showing up in the village, whom they regard as robbers. Occasionally, the rapid change of lifestyle, living conditions and social networks provoke the feelings of loss of self-identity and self-value especially for the elderly.

Migration also exerts changes to community culture and rituals. In the past, villagers in their hometowns had the custom of celebrating important festivals such as Chinese New Year together by treating each other food and gifts. Wansheng migrant village consists of different groups of people that can dismantle the migrants' traditions of collective celebration. As one respondent wrote in the questionnaire that "Chinese New Year has become less and less interesting and important in new resettlement". (Questionnaire filled by anonymous migrant villager on 24 March 2014 in Hohhot).

Chinese people have the culture of respecting and visiting deceased relatives at graveyards in important holidays. But the new migrant village is far from their old mountainous hometown where the graveyards locate. The long distances to former residencies have radically transformed the ritual of graveyard visiting, with many villagers giving up going back to their former lands to clean graves and pay tributes to the deceased. The cultural change is more radical for ethnic Mongols and herders, who are well-known as "brave race in the horseback". Migration to settlements in semi-urban setting marks the end of the tradition of living nomadic life and herding freely in grasslands. One respondent emotionally commented in the questionnaire "In real sense, those horse riders chasing after big flocks of sheep are no longer the nomadic Mongolia herders. They just showcase their dying life and tradition for tourists." (Questionnaire filled by a migrant villager on 22 March 2014 in Urad Zhongqi)

3.3. Environmental Impacts

Minimizing anthropogenic activities; grazing, farming and extracting natural resources in ecologically fragile zones are major components of environmental migration and ecological rehabilitation. After moving populations out of ecologically fragile zones, grasslands, farmlands and forests that have previously reached carrying capacities are mitigated and restored by replanting, re-nourishing or rehabilitating naturally.

Since the implementation of environmental migration and the Beijing-Tianjin Sand Source Control Project in 2000 in Inner Mongolia, grasslands with salinity, desertification and degradation problems (San Hua) have declined from 1200 km² to 733 km². Forest and grass covered lands in Inner Mongolia have expanded by 101 km². The quantity and quality of grasslands in sand-controlled areas have increased greatly since 2000, with canopy density reaching 0.4 and grass coverage raised from 33% to 65% in Inner Mongolia (Li 2013). In general, the scale and speed of land deterioration in ecologically fragile zones is under control and greatly mitigated. In this aspect, environmental migration and demographic re-distribution exert positive environmental impacts for areas of origins.

A reported 'sounder ecosystem' by official figures partially corresponds to some migrants' narration. Some residents in Wansheng migrant villages described what happened to their old villages. They stated that the mountainous areas they used to live look healthier and livelier than before, and vegetation (grasses, bushes and woods) is denser. In the past, sands and deserts expanded due to deforestation and excessive farming. Today, the encroachments of sands slow down attributing to increased vegetation coverage and reduced human activities.

However, environmental restoration by restricting human activities in pastures, farmlands, forests and mountains is not consistently and fairly enforced. Human rights organizations disclosed the existence of land grabs and mining extractions in grasslands and farmlands, where former residents were relocated out and grazing and destructive activities were banned (SMHRIC 2014).

Abundance in and accessibility to water and land resources are important criteria in selecting destinations of migration, according to the 2013 Plan. This criteria is important in the sense that ecosystems of destination should be suitable to support the influx of migrants without being damaged. However, big-sized resettlement is possible to ameliorate or aggravate local environments. The most immediate impacts on destination areas are mounting yields of solid wastes and wastewater from households, farming and livestock breeding. The situation is worsened due to absence of solid wastes and wastewater treatment in most rural areas and small towns of China. Although new resettlements are well equipped with electricity, gas, insulation and drainage pipes, lacking in on-site capacity to handle wastes and wastewater can pollute or degrade the eco-system of host places. For instance, increasing numbers of caged cattle in migrant villages produce considerable amounts of feces that in return contaminate the water and lands (Figure 7). Most migrant villages are ill-equipped or incapable to handle waste problems responsibly, they just maintain the practice of dumping wastes in ditches, landfill sites or barren areas nearby the villages.

Figure 7. Milk Cow Breeding Shelters in Migrants Village



Source: Sohu News 2008

Water resource is a long-term constraint in Inner Mongolia. It is more harmful for migrant settlements because rising population in host places lead to ascending water consumption for daily life, husbandry irrigation. Climbing water demands pose challenges for host governments to re-plan and and upgrade water resource management systems.

4. CONCLUSION

The complexity of environmental migration in Inner Mongolia is well represented by the contradictions and fragmentations of impacts happening at both macro and micro levels. In this context, the effectiveness and impacts of environmental migration in Inner Mongolia should be examined and evaluated on general levels and specific cases. Generally speaking, progress has been made with respect to curbed land degradation, recovered vegetation and income growth. However, the impacts of migration on a particular village or a specific group are too varied to reach assured conclusions. Some migrants are better off after migration, for example former farmers who move to Darhan Minggan experience increased incomes due to cash crop cultivation. In contrast, some migrants living in the same village with the better-off people are exposed to bitter life due to income drop. For instance, former herders who face difficulties to take care of caged cattle or take up farming. Restored ecosystems as a result of environmental migration are stained by speculations or land grabs in ecologically fragile zones that should be left untouched by industrial development. Environmental migration unites people of different backgrounds to share

the same land in migrant villages, but meanwhile indigenous traditions and ethnic cultures are endangered due to separated and shattered communities.

The above dilemmas and contradictions involved in environmental migration are valuable references for the government at various levels and other stakeholders to reflect, adjust and reform the established strategies, policies and governance on environmental migration. There is hope that while the 2013 Plan is still in its initial stage of implementation, the Chinese Central Government and various regional authorities within Inner Mongolia have a chance to reflect on those lessons and readjust policies to better support and manage environmental migration. ♦

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