

China's Largest Scale Ecological Migration in the Three-River Headwater Region

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Received: 11 August 2009 / Accepted: 19 August 2009 / Published online: 3 June 2010

This synopsis was not peer reviewed.

INTRODUCTION

Over the past three decades, China's economic growth has been the fastest among major nations. However, its environmental degradation has also accelerated (Liu and Diamond 2008). To mitigate the degraded environment, China has been implementing large-scale conservation programs, including the Key Shelterbelt Construction Program, Beijing-Tianjin Sandstorm Control Program, Wildlife Conservation and Nature Reserve Development Program (Ouyang 2007), Forest Eco-Compensation Program (Ministry of Finance of China and State Forestry Administration of China 2007), the Natural Forest Conservation Program, and the Grain to Green Program (Zhang et al. 1999; Xu et al. 2006; Liu et al. 2008).

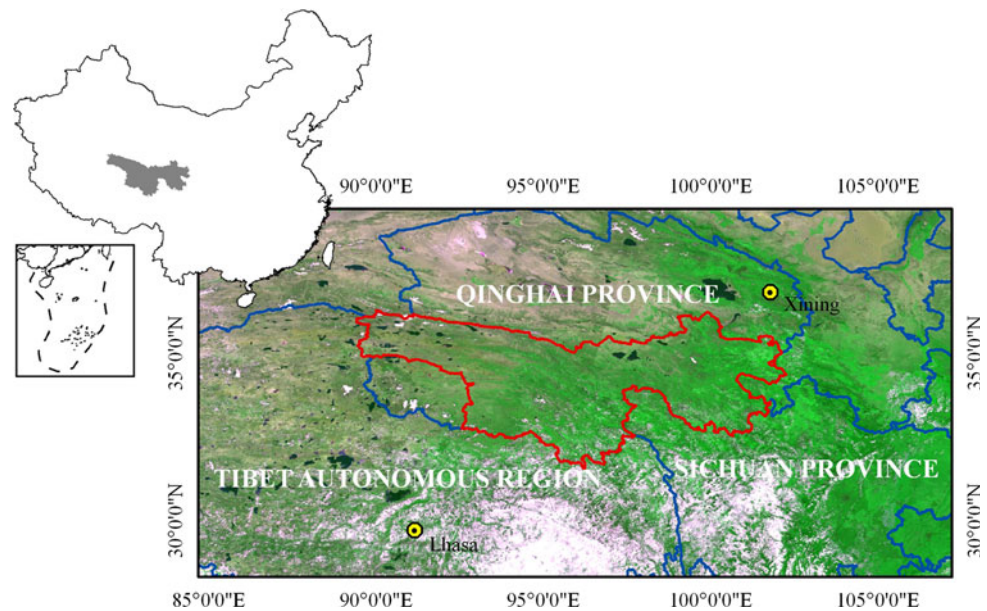
The Three-River Headwater (TRH, Sanjiangyuan, Fig. 1) region is located in the core of the Tibet Plateau, China, and covers 363,000 km² with the average altitude of 4,200 m. It is the world's highest altitude region with the richest biodiversity, and contains China's highest elevation and largest area wetlands (Committee 2009). The TRH region, known as China's, and even Asia's water tower, is the headstream of the Yangtze River (Chang Jiang, the longest river in China and the third longest in the world), the Yellow River (Huang He, the second longest river in China, referred to as the cradle of the Chinese civilization), and the Lantsang River (Lancang Jiang, an international river called the Mekong River outside China). This region provides 25% of the water volume of the Yangtze River, 49% of the Yellow River, and 15% of the Lantsang River (Qin et al. 2008). In 2000,

the Chinese government established the TRH reserve with an area of 152,300 km²—a land area larger than England and Wales combined, to protect this most unique and fragile ecosystem.

The TRH region suffers from global warming and the explosive increase in the intensity and extent of human activities (overgrazing, poaching of plants and wildlife, gold mining, etc.) (Zhao and Zhou 2005). Rangelands are severely overgrazed, and 58% of rangelands are moderately to severely degraded. Soil erosion has deteriorated about 26.5% of the region's total land area. Rat infestation is widespread and the number of mouse-hole per hm² is 1,335. Draught-up days of rivers are increasing (Lu 2007). The average annual runoff decreased more than 20% during the past 50 years (Qinghai Provincial Government 2005). Nearly one-fifth of its species are threatened (Cai 2008). The environmental degradation is also causing economic losses, and even brought about so-called "ecological refugees." For example, Maduo County was one of the richest counties of the country in the early 1980s; however, it is now one of the 10 poorest counties, mainly due to ecological degradation caused by overgrazing (Gu et al. 2005).

The deteriorating ecosystems prompted China to take an unprecedented conservation action—the Ecological Protection and Restoration Program (EPRP) in the TRH region in 2005 (Engineering Consulting Center of Qinghai Province 2005). The EPRP conserves and rehabilitates ecological functions through ecological migration, grazing bans, wetland protection, and harnessing degraded grassland. The EPRP is regarded as another large landmark project after the Development of the West Regions and the Qinghai–Tibet Railway. The Ecological Migration Program (EMP) among the EPRP in the TRH region, meaning local residents should move out from the reserve to restore the ecosystem and

Fig. 1 China's water tower.
Based on the MODIS product
(MOD09A1V5), 12 August 2008



protect the environment, is deemed the country's largest scale ecological migration for ecological compensation. A total of 7,500 million yuan (at present, \$1 U.S. = 6.8 yuan) was budgeted for the EPRP, and 1,500 million yuan was allocated for the EMP. By the end of this program in 2010, almost all local Tibetan race residents are expected to be relocated to protect the vulnerable environment.

AMBITIOUS AND EFFECTIVE ECOLOGICAL MIGRATION PROGRAM

The EMP has set an ambitious goal of moving 100,000 local herdsman, of which 90% are Tibetan ethnic groups, out the core and buffer zones of the TRH reserve and starting livelihoods in cities and towns. From 2005 to 2008, the EMP achievements have been remarkable:

- (1) By the end of 2007, 86 migration communities have been established, 61,889 people and 13,305 households moved into cities and towns for their livelihood (Bureau 2008).
- (2) Each voluntary EMP household was provided with an 80 m² house for free. Locations of the EMP villages were carefully selected together by the herdsman and local governments. Cities and towns with better infrastructure were the herdsman's favorite choices.
- (3) Subsistence allowance of 8,000, 6,000, or 3,000 yuan per year was paid for each household, based on migration distance and living conditions (Zhang and Gu 2007).
- (4) Job opportunities were offered. The local government helped migrants engage in crop production, business, labor service transfer, etc. Governments offered preferential policies such as quick and duty-free

processing when ecological migrants applied for business permission (Development and Reform Committee, Qinghai Provincial Government 2007).

- (5) Reemployment trainings such as machine repair, construction, cooking, handicraft making, and vegetable growing were widely implemented. The government offers more than 800 yuan per person for the vocational education and training of the people to be relocated (Ga 2008).
- (6) During migration, efforts were made to retain Tibetan folk customs and cultures. Folkways, customs, and cultural symbols of Tibetan ethnic groups were considered and respected. For example, bright colors and neat lines that characterize the Tibetan style were used to decorate the newly built houses. Meanwhile, many buildings for celebrations and religious activities of Tibetan ethnic groups were built in migration communities (Qiang 2008).
- (7) According to the results of field and remote sensing investigation, implements of ecological migration and grazing bans have resulted in great increase in grassland coverage and biodiversity (Jiang and Dai 2009).

PROBLEMS AND SUGGESTIONS

Although the EMP in the TRH region has led to a series of accomplishments, there are also many challenges and unexpected outcomes as discussed below. However, the experiences learned from the policies on payments for ecosystem services in the past several years in other big projects (Liu et al. 2008) have laid a good foundation for its continuation and expansion.

- (1) A big gap was estimated (at least 500 million yuan per year) to exist between the demands for migrants' livelihood and the subsidies the EMP provided. The originally planned duration of subsidies is too short for degraded ecosystems to recover fully or for migrants to acquire other livelihood skills. Reports have indicated that if subsidies end, it is possible that some migrated herdsmen will go back to grazing because no other jobs are available (Lu and Wang 2007). It will be necessary to extend the duration of subsidies and to diversify funding. So far, the EMP has been largely financed by the central government and has caused financial hardships for some local governments. Market-oriented mechanisms should be explored with the assistance and support from the central government and other stakeholders. The EMP has many beneficiaries who could contribute to the payments, including hydropower plants, insurance companies for flood and drought disasters, people and business in the middle and lower reaches of the three big river basins, and even other countries (e.g., Burma, Laos, Thailand, and Vietnam, through which the Mekong River flows) that benefit from the ameliorated water source environments.
- (2) The EMP changed the income structure of numerous former herdsmen by making them shift from grazing to other activities or unemployment. This program has generated a large number of surplus laborers. If no enough and suitable jobs were supplied, it could lead to a new migration phenomenon, that is, re-migration. More attention should be given to training in job skills and development of replacement industries, so as to guarantee long-term sources of income for the migrated people. Free education, unemployment insurance, medical insurance, and endowment insurance should be implemented as soon as possible to ensure social stability (Wang and Jiao 2008).
- (3) The mismatch between traditional production and lifestyles of migrated Tibetan herdsmen and the fast-paced modern society will become apparent in the long run. Moving from alpine cold meadows and steppe landscapes measuring >4,000 m to modern cities measuring >2,000 m changed the herdsmen's lifestyle through the centuries. Some migrants returned to grazing because they could not adapt to the urban lifestyle (Xu 2008). A new way of life that blends traditional customs and modern urban society needs to be found.
- (4) After the construction of the Qinghai–Tibet Railway that goes through the TRH region (Peng et al. 2007), convenient transportation has brought cheap goods as well as the popular culture and consumerism of big cities, which produce garbage in large quantities.

New migrants learned modern consumption style, but not the modern management style, modern consciousness, and technology for garbage disposal (Lu and Wang 2007). More effective measures should be taken to conserve the environment of the EMP communities. To carry this out, more investment, increasing environmental awareness, and comprehensive monitoring should be considered first.

CONCLUSION

The Three-River Headwater region suffers serious environmental degradation problems. Unprecedented conservation actions were taken in 2005. Among these measures, the EMP is deemed the country's largest scale ecological migration. The migration program has set an ambitious goal and has made remarkable achievements. If carefully managed, the ecological migration project in the TRH region will ultimately promote the sustainable ecological, social, and economic development of the region—China's water tower. To make the EMP more successful, it is essential to develop and adopt new strategies to overcome its shortcomings and enhance its potential. This program provides important insights into opportunities and challenges in the development, implementation, and sustainability of similar ecosystem service payment programs, at present and in the future, both in other regions and developing countries.

Acknowledgements This study is supported by the National Basic Research Program of China (No. 2009CB421103) and the Knowledge Innovation Program of Chinese Academy of Sciences (KZCX2-YW-341).

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