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Impacts of the Natural Forest Conservation Program on the livelihoods of residents of Northwestern China: Perceptions of residents affected by the program

Shixiong Cao [a,1], Xiuqing Wang [b,2], Yuezhen Song [c,3], Li Chen [d,4], Qi Feng [e,*]

[a] College of Water and Soil Conservation, Beijing Forestry University, Beijing, 100083, PR China
[b] College of Economics and Management, China Agricultural University, Beijing, 100094, PR China
[c] College of Humanities and Development, China Agricultural University, Beijing, 100094, PR China
[d] Water and Soil Conservation Institute of Yan'an City, Yan'an, Shaanxi, 716000, PR China
[e] Cold and Arid Regions Environmental Engineering Research Institute, Chinese Academy of Sciences, Lanzhou, Gansu 730000, PR China

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ABSTRACT

Conservation of the ecological environment presents scientists with a challenging dilemma because the strategy often leads to negative impacts on impoverished people in the area affected by the project. To consider this problem, we investigated the implications of China's national and regional policies related to the Natural Forest Conservation Program (NFCP) for poverty in the dryland regions of northern Shaanxi Province. We found that 34.9, 47.0, and 59.8% of farmers, livestock grazers, and forest workers respectively, felt that their livelihoods had been adversely affected by the NFCP due to the ban on logging and grazing imposed by this program, and they perceived additional economic losses because they were not adequately compensated for their economic losses under the program. These perceptions are supported by economic data. In addition, our results showed that the poorer the survey respondent, the greater the likelihood they believed that they had suffered from the implementation of the NFCP. Although Chinese citizens have become more favorable towards environmental conservation efforts, the poorest citizens still need considerable help to make it possible for them to participate in both economic development and environmental restoration.

1. Introduction

More recently, researchers have increasingly recognized that economic losses are arising from this ongoing environmental deterioration (Balmford et al., 2002). As the magnitude of human impacts on the planet's ecological systems becomes ever more apparent, there is increasing realization of the intimate connections between these systems and human health, the economy, social justice, and national security (Lubchenco, 1998; Ehrlich, 2001; Serageldin, 2002). Sustainable development as a concept exhibits broad political, economic, and ecological appeal, but has proven difficult to define in precise terms because of the differing goals of many stakeholders, and particularly those of the most impoverished members of society. Recent scholarship has focused on the nature of a sustainability transition, which was described at the 2002 World Summit on Sustainable Development in Johannesburg as meeting the needs of a stabilizing future world population while reducing hunger and poverty and maintaining the planet's life-support systems (Parris and Kates, 2003; Wright and Okey, 2004). Starting at the 1992 World Conference on the Environment and Development in Rio de Janeiro and continuing at the 2002 World Summit on Sustainable Development in Johannesburg, the concept of sustainable development has been gradually extended to make explicit reference to justice, equity, and the elimination of poverty (Adams et al., 2004). However, without financial and technical support from central governments, poor regions will find it difficult if not impossible to escape the poverty trap, in which poverty leads to environmental degradation and environmental degradation deepens poverty (Yang and Pan, 2001). Sadly, this dilemma affects the world's poorest people most severely because of their narrower margin for survival, lack of access to modern technologies, vulnerability to natural hazards, and the fragility of the ecosystems in which they are concentrated (Sachs, 2004). This vulnerability may be exacerbated by unjust or ineffective policies, such as the environmental policy described in the present paper.

China, the world's most populous country, has one of the largest territories and a booming economy. However, forest cover now accounts for only 16.5% of its area (Liu et al., 2003). As a result of these factors, China faces greater environmental challenges than other major countries. Of the 142 countries for which environmental

* Corresponding author. Tel.: +86 931 496 7089; fax: +86 931 827 3894.
E-mail addresses: shixiongcao@126.com (S. Cao), wangxq@cau.edu.cn (X. Wang), jisuzhen@126.com (Y. Song), lichen1969@126.com (L. Chen), qifeng@ns.lzb.ac.cn (Q. Feng).
[1] Tel.: +86 10 6233 6097; fax: +86 10 6233 8689.
[2] Tel./fax: +86 10 6891 9773.
[3] Tel./fax: +86 10 6273 8112.
[4] Tel./fax: +86 911 238 3288.

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sustainability has been evaluated, China ranked 129th, higher only than Nigeria among countries in a comparable stage of development (Liu and Diamond, 2005). The 1998 floods that affected 240 million people shocked the government into action. Under the 1999 Natural Forest Conservation Program (NFCP), China's government has pursued one of the world's most ambitious conservation set-aside programs, including other Chinese conservation set-aside programs such as the Grain for Green Project (GGP). The NFCP bans any further logging of natural forests in the upper and middle reaches of the watersheds of major rivers such as the Yangtze and Yellow rivers (Uchida et al., 2005). The specific objectives of the NFCP, as it was initially approved, are (1) to reduce annual timber harvests from natural forests from 32 million m^3 in 1997 to 12 million m^3 by 2003; (2) to conserve nearly 90 million ha of natural forests; and (3) to afforest and revegetate an additional 31 million ha by 2010 by means of mountain closure (the elimination of forest harvesting in mountainous areas), aerial seeding, and artificial planting (Chang, 2005). The State Forest Administration (SFA), in its formal approval of the NFCP in 2000, decided to spend 96.2 billion yuan (RMB) (US $11.6 billion) over the next 10 years on forest protection, regeneration, and management, the relocation of forest workers, and other related tasks (SFA, 2007). In addition, the SFA has been charged with administering both the NFCP and the GGP, while other government agencies responsible for agricultural and livestock production, water and soil conservation, poverty alleviation, and environmental protection are not formally involved. Therefore, inter-agency cooperation and coordinated implementation is very weak (Xu et al., 2006). By the end of 2003, 79.3 million ha of suitable grassland had been planted with trees (Tao et al., 2004; Tang, 2004). The government provides US $91/ha through local forestry authorities so citizens can purchase seeds and seedlings and use these materials to restore wasteland, but this money can only be used to purchase these supplies, and workers are required to invest weeks of their own time for such remediation activities, with no other subsidies provided to compensate the workers for their efforts (Zhang et al., 2000). Although grain is provided as compensation under the GGP for farmland withdrawn from cultivation, no such compensation is provided under the NFCP for afforestation activities. In the absence of such incentives, it is not known whether such workers will be willing to continue doing this work, or will be forced by a lack of compensation to return to agriculture, herding animals, or forestry activities to ensure that they can earn a livelihood. Given that more than 20 million rural residents are affected by the NFCP (Xu et al., 2003), and that a lack of compensation for their work under this program may force many of them to return to their previous livelihoods, their attitudes and behavior will thus play a key role in determining the NFCP's success in protecting the sustainability of the country's environment. Currently, the only compensation these people receive is a grain subsidy provided under the GGP. Based on the results of previous surveys about attitudes towards the GGP in this region (Cao et al., 2009a), 29.0 to 37.2% of rural residents have stated that they plan to return to unsustainable farming, grazing, and forestry activities when the program ends in 2010 (i.e., subsidies will continue until 2018). This represents a total of 156 million people who will potentially stop supporting the program in the near future.

Although there has been increasing interest in trying to link the livelihoods of people living near natural resources to the impacts of conservation of those resources, there has been little attempt to systematically assess or measure this linkage (Salafsky and Wollenberg, 2000). To provide such information for China, our study focused on how China's national and regional policies related to the NFCP will affect poverty in the dryland regions on the border between Shaanxi Province and Inner Mongolia. To determine these impacts, we surveyed local rural citizens to investigate issues of concern related to their income (net income, including cash income and other consumable agricultural production they obtained from their use of the land that can no longer be obtained under the NFCP) and their perceptions towards the NFCP within the context of the broader national and regional policy debates that frame these concerns. Our study aimed to highlight how the attitudes of those affected by the government's policies will interact with the policies to enable or constrain rural environmental restoration and how this interaction will affect livelihoods based on the affected resources. The results are important and timely, not only with respect to the NFCP, but also with respect to attitudes towards reforestation by different socioeconomic groups. In addition, the NFCP is being implemented using a new combination of policy tools that may have relevance for other countries, and particularly for rapidly developing countries. If projects such as the NFCP are emulated elsewhere, those who implement them must understand the human consequences of their policy choices and how those consequences will support or undermine the policy.

2. Materials and Methods

2.1. Study Area

Our study region was located in the Ziwuling Mountains area near Yan'an City in China's northern Shaanxi Province (Fig. S1). In the study area, the topography is characterized by steep slopes that create a need to protect the land against erosion. The mean annual temperature in the study area is 9.4 °C, with 147 frost-free days per year. Precipitation averages 564 mm yr^{-1}, with potential evapotranspiration of 794 mm yr^{-1} from 1995 to 2005. Before the NFCP, farming of 1.0 to 1.5 ha of land per family (mostly on sloping land in the study area) and raising of 1 to 2 animals (cattle, donkeys, and pigs) per family were the typical sources of income for smallholders, whereas grazing accounted for most of the income of livestock grazers near Yan'an City, who formerly survived by grazing 50 to 200 sheep and a few cattle per family on public grassland. It is also worth noting that most families in the study area own at least one animal that they also graze on public land, even if they do not consider themselves to be herders. Although the government owns this land, the farmers and livestock grazers were allowed to use the land free of charge before the NFCP. Forest workers were employed by Forestry Bureaus (managed by the central or local government) and were formerly assumed to have secure lifetime employment, as is frequently the case in China (SBSP, 2005).

Since 1998, farming, grazing, and logging have been excluded from all the natural forests, afforestation areas, and pastures in forested parts of the region due to the implementation of the NFCP. The vegetation in the study areas has historically suffered from serious damage caused by agriculture at unsuitable sites, forest exploitation, excess grazing, and monoculture planting of forest trees and agricultural crops, but the region nonetheless retains some natural secondary forest of the western deciduous broadleaved forest type from the warm-temperate zone of China. The NFCP project focuses mostly on degraded land on steep slopes (>25°), which is most likely to experience severe erosion and other adverse impacts resulting from unsustainable farming, grazing, and logging. By the end of 2003, 85 500 ha of degraded grassland had been planted with trees, including 11 000 ha of afforestation, 18 600 ha of area in which grazing and logging were banned to permit the restoration of natural vegetation, and 55 900 ha of afforestation performed by aerial seeding. In total, these projects accounted for 2.5% of the area of natural secondary forest in Yan'an City (SBSP, 2005). Note that unlike in many other countries, a Chinese “city” includes both the built-up urban area, and a large administrative area that surrounds the urban area and that includes a large area of natural and managed land.

2.2. Investigations and Analysis

Conceptually, a “livelihood” represents the means, activities, entitlements, and assets by which people earn a living (Cao et al., 2009a).