



## Payment for Ecosystem Services and Alternative Livelihoods in Rural China

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**Short title:** Payments for fresh water conservation, China

**Key Message:** Payment for ecosystem services scheme in Pingwu County, China, increases the effectiveness of the payments and the overall scheme, by addressing the loss of industry in the village by providing villagers with additional training, and thus new sources of income.

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### What was the Problem?

The village of Yujiashan lies in the Minshan mountains, which form the border between the Sichuan Basin and the Qinghai-Tibetan plateau. This unique region (partly sub-tropical, partly alpine) is home to an extraordinary diversity of life, including the Giant Panda. In 2007, Yujiashan and the surrounding area were designated as a county-level nature reserve – an important step, but not one that could solve the ecological and social pressures facing the village.

Government efforts to convert cultivated land into forest (the “Grain to Green Program,” in place in Sichuan Province since 1999) reduced the area of farms in Yujiashan from 175 mu to 19 mu<sup>1</sup>. The government provided food subsidies in exchange for retired farmland. While this benefited subsistence farmers, it substantially changed the social fabric of the village. Village farmers, with little to do after retiring their farms, began migrating to cities for employment – leaving behind older and weaker villagers to run their households. The people who stayed in the village began raising more domestic animals (a relatively new phenomenon in Yujiashan), and few people had experience managing animal waste. In addition, villagers began using fertilizer and herbicides (which they had not used prior to 2002) intensively in the remaining fields in order to maximize income while minimizing labor. The villagers also continued to harvest timber for fuelwood and to sell as charcoal (an illegal practice under the new law), which contributed to continued soil erosion.

The chemical refuse from Yujiashan flows downstream to the local county seat, Pingwu City and as a result, in 2005, the river running through Pingwu City was classified as lightly polluted (a II on the Chinese scale of I – V).

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<sup>1</sup> Mu is a Chinese unit of area. 1 mu = 666.6 m<sup>2</sup>

The problem was very simple: clean up Pingwu's water supply by eliminating the pollution streaming out of the Yujiashan Nature Reserve. In 2007 the Shanshui Conservation Center and Conservation International decided to work with the villagers in Yujiashan to find permanent sources of new income that would help them to stop polluting, and protect the water supply.

### **Which Ecosystem Services were evaluated? How?**

Shanshui Conservation Center and Conservation International considered three types of ecosystem services in their evaluation: the preservation of biodiversity, the supply of clean water and carbon sequestration.

The annual operating costs of the local Nature Reserve were introduced as a proxy for the cost of preserving biodiversity. Admittedly, this number does not represent 'willingness to pay' and should be considered a low estimate because the reserve is recently founded and its administration is still too small to perform its full range of duties.

In order to calculate the value of a clean water supply, the amount of water flowing from each watershed in the Yujiashan area was calculated and multiplied by the average cost per cubic meter of water stored for building a drinking water reservoir in China. This produced a proxy for the per-unit cost of supplying baseline-quality water for consumption throughout the Yujiashan area.

The Yujiashan Nature Reserve is predominantly forest (apart from the village) and sequesters carbon dioxide from the atmosphere. As this is also a vital service performed by the ecosystem, the amount of carbon sequestered within the reserve was also calculated. The reserve was divided into areas classified by predominant types of forest and the mass of annual carbon sequestration was calculated using the average growth rates of each type of forest. Prices from existing carbon markets (2007) were used to provide an estimate. In the event that a carbon market appears, the market value of carbon could be used to value the area's carbon sequestration service. Pending this development, however, the per-tonne cost of recent afforestation projects in Sichuan Province was used to derive a second estimate for the value of the growing stands.

It is estimated that the total firewood harvesting and charcoal-producing activities in Yujiashan consume roughly 1% of the total forest cover in the reserve. Since the forest does the work of both water conservation and carbon sequestration, payments directed to the village should, in theory, total 1% of the total value calculated for both services.

### **What was the resulting policy uptake or policy change?**

Shanshui, Conservation International, and the Pingwu County government decided that payment for water conservation was the most practicable of the schemes drafted. The project was implemented in 2010 and payments will be provided to the village (as outlined above) from a fund established and administered by Shan Shui, Conservation International, and the local government. People from Pingwu City may also contribute voluntarily to the fund when they pay their water utility fees.

Efforts were also made to provide the villagers with a sustainable energy supply and new occupations as addressing the loss of industry in the village is crucial for making the payments effective. Capital was provided to pig-owning villagers to build biogas plants which capture combustible methane from fermenting dung. This gas can be used for cooking and lighting, and

the remaining material is also a potent fertilizer. Villagers were also provided with start-up capital and training to cultivate bees. These activities, it is hoped, will lessen the pressure to harvest trees for firewood and charcoal production.

**References:**

This document was compiled from Chinese and English-language internal memoranda, which Shanshui can provide upon request.