

A Case for Farmers and Rural Communities' Right to Compensation Under China's Natural Forest Protection Program (NFPP)

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EXECUTIVE SUMMARY

China's Natural Forest Protection Program (NFPP) started in 1998 and has been hailed a great success in preserving and improving ecologically-sensitive forests and watersheds. More than 100 million hectares of forestland have been designated as NFPP zones where logging or other harmful activities to ecosystems are prohibited. More than one third of the NFPP forestland and forests are owned collectively by farmers. Because of the logging ban, farmers and rural communities, traditionally dependent upon mountains and forests for basic livelihood, cannot harvest trees or develop the land for other purposes. These farmers, who typically live in China's poorest regions and the mountainous interior, have been further impoverished by the NFPP, which does not compensate for their losses at all. They and their communities have suffered tremendously.

There is a series of strong policy, legal and social reasons to reform the NFPP so that affected farmers and communities are properly compensated. This paper will focus on the implications of two possible approaches to reforming NFPP: Payment for Environmental Services (PES) and regulatory takings.

Even though China characterizes the NFPP as a type of PES, existing NFPP payments cover only the cultivation, maintenance, and management costs of the NFPP forests. Conspicuously, there is no "payment" to the actual providers (i.e., the affected farmers and communities) of the ecological benefits and services that are enjoyed by the entire society. According to a conservative estimate, approximately 15.3 billion yuan (about US\$2.3 billion) every year is due, but not paid, to farmers and communities.

Alternatively, affected farmers and communities are entitled to fair compensation under the theory of "regulatory takings." When a government regulation or program deprives property owners of all viable economic use of the property, the effects of the regulation are similar to a compulsory expropriation or taking of the property by the government and thus proper compensation is called for. Because of the logging ban, farmers and rural communities are prohibited from making any economic use of the forestland or trees. It follows that the government should compensate for the diminished value of the forestland and trees as a result of the NFPP.

This paper offers preliminary recommendations to reform the policy, law and institutional practices concerning the NFPP. Meaningful changes must take place so that affected farmers and rural communities are fairly and adequately compensated. Otherwise, the NFPP will not only result in a massive scale of injustice and poverty in rural China but also jeopardize the program's long-term success in ecosystem preservation.

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I. INTRODUCTION ON CHINA'S FORESTLAND TENURE AND NFPP

1. The Dual Ownership System and Current Tenure Reform

In terms of legal ownership, forestland in China is owned by either the state or collectives (village communities). It is estimated that 60 percent of all forestland in China is collectively-owned, and the state owns the remaining 40 percent.¹ State-owned forestland can be either commercial timber forests run by state-owned forest enterprises or ecological protection forests managed by state forest farms.

In the Chinese context, “collectives” refer to villages or village teams that consist of approximately one dozen to several hundred rural households within a community. Typically, the village administrative committee, composed of several appointed or quasi-elected village officials, acts on behalf of the collective to manage its forestland and forests.²

One of the greatest causes of tenure insecurity in rural China is the ambiguous role of collective ownership. Starting in the late 1970s, China conducted a massive land reform program where Soviet-style collective farms were dismantled and virtually all arable land was distributed for farming among individual farm households. Under this new tenure system, collectives remain as the legal owner of land but farmers enjoy a broad spectrum of rights to farm land and sell agricultural products without much interference from collectives (“use rights”). This reform greatly motivated hundreds of millions of farmers, significantly improved agricultural productivity, and consequently lifted the vast majority of the rural population out of poverty.³

In time, farmers’ effective use rights became broader, though the definition of collective ownership still remained unclear. In many places village officials still possess great influence in dealing with land rights without consent from farmers, claiming that they are merely acting as the legal owner of land. A 2007 Property Law stipulated that collective ownership means “joint ownership” by all members of a collective.⁴ A reasonable interpretation would be that the village administrative committee itself is not the land owner; instead, the committee and village officials simply exercise ownership rights on behalf of all village members (farmers). Currently, ordinary farmers have little means to hold village officials accountable, as officials answer only to their superiors. As a consequence, there are frequent reports regarding abusive or corrupt village officials selling off farmers’ land.

It is important to note that the land reform that began in the late 1970s did little to affect forestland, most of which is still managed by village officials. This collective management model has been widely considered ineffective and inefficient.

In 2003, the central government announced a pilot program in several provinces to reform forest land tenure systems.⁵ The main approach of this program is to copy the early farmland reform by distributing collectively-owned forestland to individual farm families. The pilots showed promising signs in the management of forestland and the development of the forest sector. In 2008, China promulgated a central policy directive, rolling out the reform to all jurisdictions. Since then, China has embarked on an ambitious plan to distribute and allocate virtually all collective-owned forestland (more than 182 million hectares) to individual rural households by the year of 2013.⁶ Under the reform, collectives retain the residual ownership rights, while individual farm households obtain “secure” use rights for a term of 70 years for forestland and full ownership over the forests. The “use rights” are a uniquely defined legal term in the Chinese context, which include the right to possess, use, develop, transact and profit under the 2002 Rural Land Contracting Law.⁷ By the end of 2009, the State Forestry Administration (SFA, China’s central forestry planning agency) reported that 130 million hectares of forestland had been distributed to

farm households, representing 72 percent of all collectively-owned forestland. Meanwhile, more than 61 million households were issued new forestland certificates to confirm their long-term use rights.⁸ This collective forestland reform is likely to have profound impact on the legal tenure regimes and forestry practices in rural China, as numerous farmers finally become “owners” of their forestland and forests.

2. Natural Forest Protection Program (NFPP)

In 1998, the Yangtze River region of southwestern China suffered one of the worst floods in history, resulting in great loss of life and property. The government blamed ecological degradation and other environmental problems caused by excessive logging in the upper Yangtze River region. Consequently, several southwestern provinces instituted a complete logging ban in large stretches of mountainous terrain where the Yangtze River originates. This is the so-called Natural Forest Protection Program (NFPP).⁹

In 2000, under then-Premier Zhu Rongji’s proposal, the central government formally adopted this initiative and expanded it to multiple regions that are considered ecologically vital to the nation. According to the official proclamation, the NFPP is a 50-year program (expiring in 2050) intended to preserve dwindling forest resources and biodiversity and improve overall environmental quality in ecologically fragile areas.¹⁰

The SFA laid out three overlapping objectives with varying timeframes for the NFPP:

- **Short-term objectives** (for the year 2000) included the complete ban of commercial logging in the upper and middle river basins of the Yangtze and Yellow Rivers, a substantial reduction of logging in Northeastern regions, and resettlement of workers employed in state-owned forestry enterprises.
- **The mid-term objective** (until 2010) is to improve management of NFPP forests and shift timber production to plantation forests outside NFPP regions.
- **The long-term objectives** (by 2050) include full restoration of NFPP forests and the establishment of a sustainable system for forest management and timber production in these regions.¹¹

The NFPP covers seventeen provinces in China. Other than Hainan and Xinjiang, which are isolated or standalone areas, the three major NFPP regions include the following fifteen provinces:

- **Yangtze River region** includes Yunnan, Sichuan, Guizhou, Tibet, Chongqing, and Hubei (*see pink area in Figure 1*);
- **Yellow River region** includes Shanxi, Gansu, Qinghai, Ningxia, Shaanxi, Henan and Inner Mongolia (*see green area in Figure 1*); and,
- **Northeastern region** includes Jilin, Heilongjiang, and part of Inner Mongolia (*see yellow area in Figure 1*).¹²



According to official reports, 104 million hectares of forestland have been designated NFPP regions at the national level.¹³ The covered forests are also known as “national priority public-interest forest” in the above-listed seventeen provinces. Of the 104 million hectares of NFPP forestland, 60 percent is state-owned, 34 percent is collectively-owned, and 6 percent is owned by other special entities.¹⁴

Meanwhile, provinces and prefectures also have the authority to designate and establish “local” NFPP zones where logging is banned. There are currently an estimated 77 million hectares of local NFPP forests in addition to the national program. As of today, all provincial jurisdictions in China, except Shanghai, have either national or local NFPP programs.¹⁵

The implementation of the NFPP has been hailed as a great success by the Chinese government for preserving and improving the whole ecological system. From 1980 to 2008, official data shows that China planted trees on more than 92 million hectares of land. China adds approximately 4.7 million hectares of newly-planted forest each year.¹⁶ The forest cover percentage improved from 16.6 percent in 2000 to 18.2 percent in 2008.¹⁷

II. THE NFPP'S IMPLICATIONS FOR THE FOREST ECONOMY

This sweeping initiative resulted in the immediate halt of commercial logging in NFPP regions. In counties where the NFPP program was implemented, commercial logging was reduced by more than half, and in some cases eliminated altogether. From 2000 to 2003, a total of 320 million cubic meters of timber resources that would otherwise have been expended were reportedly saved by the NFPP.¹⁸ Initial assessments have shown that ecological and environmental indicators are improving gradually as a result.

1. State-owned Forest Sector

Because 60 percent of NFPP forestland is state-owned, the majority of policy-makers' attention has been focused on state-owned forest farms or enterprises (e.g., logging stations and wood-processing factories). For decades, a large number of state-owned forest farms and enterprises had relied upon logging and timber production for revenues. They lost a major source of income due to the logging ban. Consequently, more than 740,000 workers and employees of state-owned forest farms, timber factories, and forest bureaus were laid off.¹⁹ Compensating and resettling the displaced forestry work force has been a great challenge for the SFA and local governments.

In addition, the main function of the affected state-owned forest farms and enterprises has changed from logging and timber production to tree planting and the cultivation and maintenance of NFPP forests including fire and disease prevention. This means that the NFPP did not reduce the workload for these forest farms and enterprises; because of the new tasks of tree planting and forest maintenance, workload has actually increased in some areas.

The end result of these changes is that a majority of state-owned forest farms and enterprises have faced great financial difficulties. Many of them are burdened by heavy debts and budget deficits that have accumulated for years, and are struggling to satisfy payroll obligations to employees (even though the salary level of these workers is considered low compared to government employees).²⁰

Since 2000, China has instituted a uniform standard to financially support the NFPP. For the better part of the first decade of the program, the central government provided 5 yuan per mu (approximately US\$11 per hectare²¹) every year to local forest bureaus to carry out the necessary monitoring, cultivation and maintenance duties for NFPP forests.²² The bulk of this funding is spent on employing a "forest protection work force" consisting mostly of surplus workers from state forest farms and enterprises.

The level of funding has increased gradually. According to a recent central regulation from the SFA, the 5 yuan per mu standard has been increased to 10 yuan per mu (approximately US\$22 per hectare).²³ This increase was substantial, but based on a literature review and the author's fieldwork in NFPP regions in Yunnan, Guizhou and Shaanxi provinces.²⁴ The actual cost of monitoring and maintaining the NFPP forests is considerably higher than the 10-yuan standard. Moreover, a substantial amount of the work force of the state-owned forest farms and enterprises remains unemployed and without a stable livelihood.

One tool to provide support to the struggling state-owned forest farms is a centrally-established special fund to support state-owned forest farms that are facing operation budget deficits due to the implementation of the NFPP. Among all the 4,466 state-owned forest farms in China, 3,800 (85 percent) are considered in poor financial condition and are eligible for assistance.²⁵ The fund provided 40 million yuan (approximately US\$5.9 million) in assistance in 1998,²⁶ and the amount increased to 220 million yuan (approximately US\$32.8 million) in 2008.²⁷ Given that there are 3,800 state-owned forest farms, compensation amounted to less than 58,000 yuan (approximately US\$8,600) per farm in 2008. That is not enough to pull these farms out of the red.

2. Forests Owned by Farmers and Collectives

Based on the author's fieldwork and existing literature, the adoption of the NFPP and the logging ban has caused considerable harm to the local economy in NFPP regions, especially in areas where forestry was an important source of employment and income. For example, in a western village in Yunnan, farmers' income decreased by at least one-third as timber production was no longer a viable option.

Similar findings are supported by a series of studies by other researchers. In a study conducted in one of the remote regions in Guizhou province, the per capita income reduction caused by the NFPP logging ban was 109 yuan (approximately US\$16) each year.²⁸ This might have seemed a rather small decrease, but this region, like many other NFPP areas, is remote and mountainous, and has inferior infrastructure, little arable land, and fewer viable industries.²⁹ Consequently, the relative negative impact to the average farmer is significant. In one particular township where forestry was the dominant industry, 62 percent of farm families saw their incomes fall below the poverty line four years after the initiation of the NFPP logging ban.³⁰

In Sichuan, a local researcher conducted a study on the effects of the NFPP on rural communities. The author identified the following problems:

- **Decreasing income for collectives:** Before the NFPP, many villages operated their own logging or wood-processing mills, generating thousands of yuan or more extra income for each village. This type of income was used to pay part of village official salaries and public facilities, but it all disappeared after the NFPP was instituted in 1998.
- **Rise in unemployment:** Nearly every household had one or more members working in the forestry sector, but most of these jobs were eliminated because of the logging ban.
- **Decreasing income for farmers:** Fieldwork shows that 60-80 percent of rural income in some heavily forested areas came from the forestry sector, but not any longer. The average income reduction per household was around 2,000 yuan (approximately US\$300).
- **Increasing difficulty for farmers to obtain fuel wood or timber for construction of farmers' houses.**³¹

Another small sample survey (225 rural families) in Hubei, Sichuan and Chongqing reveals similar concerns. The data shows a general trend that forestry sector income decreased for farm households:³²

	Average decrease of forestry sector income per household (yuan)	Average per household income after the NFPP (yuan)	Reduced forestry income in relation to total household income
Hubei	512	5,375	9.5 percent
Sichuan	179	12,344	1.5 percent
Chongqing	578	6,942	7.6 percent
Average	398	8,143	4.9 percent

The extent of income reduction varies in relation to how large a role the forest sector played in the local economy. But it is clear that rural communities and farmers have suffered substantial financial losses due to the implementation of the NFPP. The fundamental problem here is that tens of millions of affected farm households and rural villages whose land is covered by the NFPP receive virtually no compensation for their lost use rights. The aforementioned NFPP funding (5 or 10 yuan per mu) is used exclusively for the purpose of maintaining and improving NFPP forests, and the SFA's attention is largely focused on the struggling state-owned state forest farms and enterprises, not the affected farmers and rural villages.

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It should be noted that most of the NFPP regions are located in the interior – and generally the poorest – regions in rural China. Income levels in the NFPP regions are considerably lower than in the developed coastal areas. As such, the affected farmers were heavily dependent upon trees and forestland for basic needs and the NFPP implementation constitutes a direct deprivation of a significant part of their livelihood. The literature so far has confirmed this trend; since the implementation, income and standard of living has fallen among affected farmers and rural communities.³³

III. COMPENSATING AFFECTED FARMERS AND COMMUNITIES FOR PROVIDING ENVIRONMENTAL SERVICES

1. The Concept of Payment for Environmental Services

PES,³⁴ broadly defined, is the practice of offering incentives to land owners and operators in exchange for managing their land to provide an ecological service. These so-called “services” are essentially the environmental benefits enjoyed by households, communities, and economies, including: food and fiber production, fresh water, air quality regulation, climate regulation, erosion regulation, water purification and waste treatment, disease regulation, and pest regulation.³⁵ Notably, three focus areas – climate change mitigation, watershed services, and biodiversity conservation – are receiving the most money and interest worldwide.

Forest loss or degradation can cause adverse impacts on those who benefit from these environmental services, thus creating scope for arrangements in which the users of the services compensate forest owners and managers for developing and maintaining forests in ways that generate the desired services. PES is a market-based conservation financing approach built on the twin principles that those who benefit from environmental services should pay for them, and that those who contribute to generating these services should be compensated for providing them.³⁶

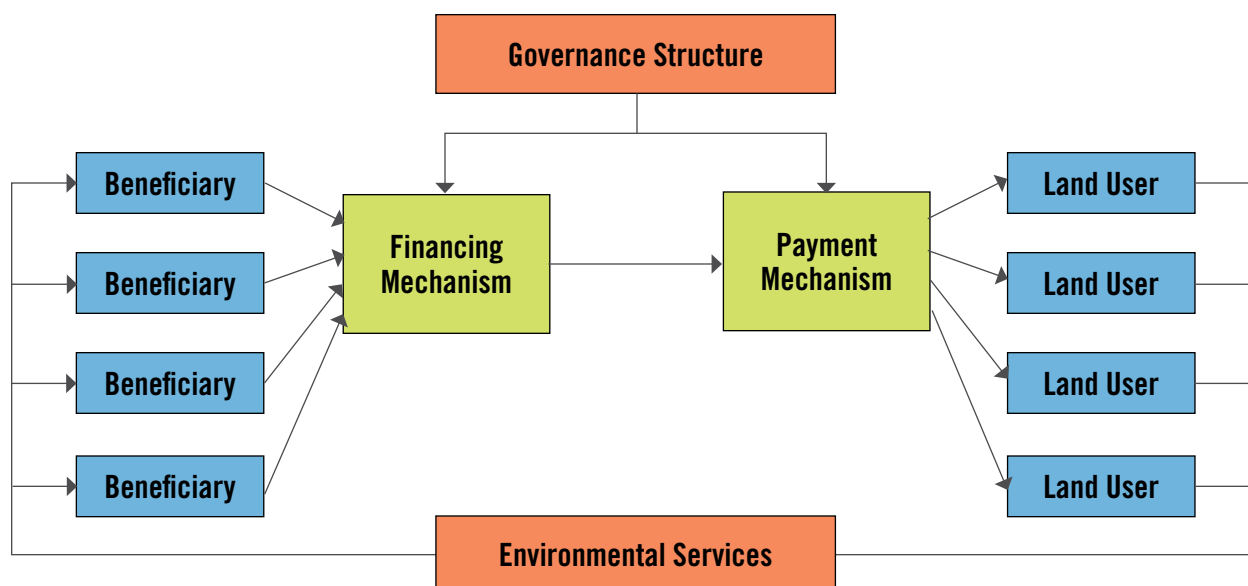
PES programs are typically mutually beneficial contracts between consumers of ecosystem services and the suppliers of these services. One party (the provider) holds the property rights over an environmental good that provides a flow of benefits to another party (the beneficiary) in return for compensation. Under basic economic theory, the beneficiaries should be willing to pay a price lower than their welfare gain (utility) resulting from the services.³⁷

Based on general international experiences, the PES approach is attractive for several reasons:

- It generates new financing, which would not otherwise be available for conservation
- It is likely to be sustainable, as it depends on the mutual interest of service providers and users, and not on government or donor funding
- It is likely to be efficient, conserving services whose benefits exceed the cost of providing them³⁸

A simplified PES structure can be visualized in *Figure 2* as follows:³⁹

FIGURE 2



For PES to achieve the desired effect, the payments must reach the land owners and operators in a way that motivates them to change their land use decisions. This is one of the greatest challenges to the success of the program. It is often necessary to set up legal frameworks and designated institutions, especially if the program is based on public financing. This will help ensure the payment program is not wholly at the mercy of annual budgetary decisions.

A PES program can have different scales: nationwide, at the scale of a river basin, or at the smaller scale of a micro-watershed. Nationwide systems may appear attractive because they can cover large areas quickly and at relatively low costs due to economies of scale. But based on existing international experiences, such nationwide systems can be very inefficient. These systems are easily distorted by political considerations and exhibit low transaction costs mainly because they sidestep the difficult questions. Local-level programs are more likely to be efficient, as they tend to be closely tailored to local needs and conditions.⁴⁰

Dozens of countries have implemented PES-type programs with promising results. One good example is Costa Rica.⁴¹ It established an elaborate, nationwide PES program, the Pago por Servicios Ambientales. A special tax is collected on all fuel products and goes to a National Forestry Finance Foundation. The money is then allocated to forest owners and operators of the industry. Costa Rica has also created Environmental Service Certificates. These certificates are issued for voluntary contributions by the private sector, and the funds are used to finance a payment program for environmental services. In addition, Germany, Japan, Canada and a number of nations have operated PES programs that offer valuable lessons and experiences.⁴²

2. The Chinese Approach to PES

China is a vast country with more than 195 million hectares of forestland, 60% of which is collectively owned by rural villages.⁴³ The ecological and other resulting benefits of such carbon sequestration cannot be overstated.

China is a vast country with more than 195 million hectares of forestland, 60 percent of which is collectively owned by rural villages.⁴³ The ecological and other resulting benefits of such carbon sequestration in a country as vast as this cannot be overstated. The first time the Chinese government formally embraced the concept of PES was in 1996, by issuing a central policy directive and calling for the establishment of an “ecological compensation mechanism.” The revised 1998 Forestry Law subsequently added that “the nation will set up a Forest Ecological Service Compensation Fund, for the creation, cultivation, protection and management of natural protection forests and special-purpose forests that are providing ecological services.”⁴⁴ The Implementation Regulation of Forest Law further mandates that “the operators of natural protection forests and special-purpose forests are entitled to compensation for the ecological services provided.”⁴⁵ However, the laws and regulations only contain general principles and fail to address many critical issues, especially how affected farmers and village collectives are compensated in this process.

The Chinese government boasts one of the world’s largest PES programs concerning forest growth and carbon sequestration. The twist is that most of the PES programs are largely established, operated, and administered in a centrally-planned manner by the Chinese government. Although PES is sometimes referred to as a “market-based instrument” or a “market for ecosystem services,” the extent of market transactions for PES in China is low. In a country where the property rights regime on collective-owned forestland is not clearly defined this is probably necessary, but it also creates a variety of issues, as discussed below.

The NFPP is considered the core of China’s PES agenda. Another important PES initiative is the “Grain for Green” program, which started in 1999 and aims to convert hilly or sandy farmland to forest-covered land in order to alleviate erosion and degradation problems. In the past ten years, the Chinese government invested more than US\$28 billion and converted 27 million hectares of previously degraded farmland into forestland.⁴⁶

A regular compensation scheme to address the impact of the NFPP, was not established until 2001, when the Ministry of Finance agreed to allocate money to support the Forest Ecological Service Compensation Fund, as required by the 1998 Forestry Law. The compensation standard was initially set at five yuan per mu (approximately US\$11 per hectare) each year. As mentioned above, this standard has been recently doubled to 10 yuan per mu (approximately US\$22 per hectare).⁴⁷

There are several problems for affected forestland owners. First of all, the current compensation levels are inadequate to pay for the forest maintenance and management costs. A recent study shows that 25.7 yuan per mu (approximately US\$61.2 per hectare) should be the minimum average compensation, which is significantly higher than the national standard.⁴⁸ There is an abundance of studies that have reached the same conclusion that the actual maintenance and management cost far exceeds the current 10 yuan per mu standard.⁴⁹ This author’s fieldwork in Guizhou, Yunnan and Shanxi has confirmed this issue as well.

Furthermore, though labeled as “compensation for ecological services,” the money is actually used for the cultivation and maintenance (including fire prevention) of NFPP forests. In other words, a land owner or operator receives this payment only if he or she performs the designated duties of maintaining and

managing the forests. Based on the PES principles as described in the previous section, such a type of payment should not be deemed as compensation for ecological services, because the payment is not for the ecological benefits produced by NFPP forests, such as air quality regulation, carbon sequestration, erosion regulation, and water purification. To call it a “payment for environmental services” program is inappropriate and misleading.

In parallel, there are true PES programs in China, mostly operated at provincial and sometimes county level. In a handful of provinces such as Zhejiang and Fujian with provincial-level “ecological forests” (similar to NFPP forests designated by the national government), special PES funds have been set up to pay for not only the operational costs but also the environmental services provided by forest owners and operators.

A good example of a PES scheme outside NFPP is in Fujian province, a southeastern coastal province with many rivers flowing into the Pacific Ocean. In 2007, it set up a special ecological compensation program where downstream regions compensate upriver region. Each prefecture jurisdiction is required to pay a specific amount of money to a provincial fund – the largest amount is paid by the provincial capital, US\$4 million each year, while the lowest amount paid by one prefecture is only US\$ 0.2 million. The amount, adjusted every three years, is determined by the average size of water consumption, ecological locations, contribution to river water flow, and economic development levels. After it receives the money from each prefecture, the provincial fund distributes funds back to the prefectures based on the amount of ecological forests in each jurisdiction.⁵⁰

This is a typical river-basin PES scheme with a clearly defined approach to determine benefits and ensure payments are delivered to providers of environmental services (i.e., owners and operators of ecological forests). However, Fujian’s unique geographical conditions are a reason for the program’s success, as demonstrated in *Figure 3* below.

Figure 3: (Note: blue lines represent rivers)



Generally, the interior, especially the western part of Fujian, is mountainous with higher elevations. The eastern part along the coastal line is relatively flat. As such, most rivers in Fujian originate from its own western mountains and flow eastward into the Pacific. This is basically the case for its biggest river system (Min River, flowing into the Pacific through provincial capital, Fuzhou) and many others. As such, it is quite convenient and effective for the provincial government to determine benefits received and reallocate money among different jurisdictions within the same province.

But this relatively compact river system is not common in China. Large river systems originate in several provinces and flow through many more provinces – each of which contributes as well as consumes water. It is extremely complicated to determine how much ecological benefit is received and by whom and how compensation should be allocated among various provinces. As a matter of fact, the Fujian example itself suffers some flaws. In the northern part of Fujian, several rivers actually originate from a different province (Zhejiang), but large parts of these rivers serve Fujian. How should the farmers and rural communities in Zhejiang get compensated for their forests serving the beneficiaries in Fujian? The opposite is also true. The southern part of Fujian is also where several rivers flowing into its southern neighbor, Guangdong province originate. Should farmers and villages in southern Fujian be properly motivated by payments from its neighbor in Guangdong?

Nevertheless, the Fujian scheme is an encouraging and positive step in the right direction. But it will require a much higher level of political commitments and greater amount of coordination among provinces to operate sustainable PES programs in China. Most of the PES programs in China are not entirely market based, which is why they exist in relatively wealthy provinces such as Zhejiang, Guangdong, and Fujian where local governments can afford to operate such programs. Most of provinces affected by the NFPP represent the poorest regions in China, and as such, it is unlikely at this time that these NFPP provinces will fund local PES programs.

3. Valuation of Environmental Services

If China considers converting the NFPP into a true PES program, the next big question is how environmental services or benefits provided by forests should be valued. It is useful to review some of the literature on this important and often controversial subject.

Environmental or ecosystem services refer to natural conditions and utility provided by ecosystems and ecological processes that sustain life.⁵¹ The Millennium Ecosystem Assessment, a UN-sponsored global ecosystem service valuation program, defines ecosystem services as “the benefits people obtain from ecosystems.” The Millennium Ecosystem Assessment classifies ecosystem services into four broad categories:

- a. **Provisioning services**, such as the production of food, timber, and fiber;
- b. **Regulating services**, such as climate regulation, flood regulation, and water quality control;
- c. **Cultural services**, such as recreational, aesthetic, and spiritual benefits; and
- d. **Supporting services**, such as soil formation, photosynthesis, and nutrient cycling.⁵²

The first notable evaluation study of environmental services was done in 1997, classifying global ecosystem services into 17 categories and assessing the total monetary value of global ecosystem services in the range of US\$18–61 trillion, with an approximate average capitalized value of US\$38 trillion.⁵³ But this type of study is of little value to governments as very few policy decisions relate to total losses of ecosystem services. Instead, good policies require an understanding of the value of changing a single unit

of a stock (e.g. trees or water). Economists refer to this as the “marginal” value of the ecosystem service in question. Of course if the value of a marginal unit is constant, then it is straightforward to go from valuing a single unit to valuing whatever number of units a given policy will create or destroy. However, the tricky thing is that for many environmental goods and services, marginal values will change with the total size of the stock, even when the overall stock level is above sustainable levels (as presently assumed).⁵⁴

Indeed, there is a great deal of confusion and uncertainty regarding valuation methodologies. The value of one type of environmental service might not be perfectly or even partially reflected in market prices and therefore require the application of non-market valuation techniques. The following table summarizes some of the major approaches:⁵⁵

Methodology	Basic approach	Limitations	Valuation examples
Market price ⁵⁶	Using market prices to value environmental goods or services (can also extend to other nonmarket ecosystem services by observing how changes in provision affect the prices or quantities of other marketed goods)	Only applicable where market data is available and reliable, market price may not reflect true marginal social and environmental costs	Non-timber forest products and timber goods, wetland productivity for commercial fishing, river stream flows for agricultural supply
Production function method ⁵⁷	Isolating and tracing the effect of ecosystem services as inputs to the production process	Data is often lacking on change in service and consequent impact on production	Maintenance of beneficial species; maintenance of arable land and agricultural productivity; prevention of damage from erosion and siltation; forest watershed for groundwater recharge
Averting behavior ⁵⁸	Defensive expenditures to avoid damages	Typically lower bound estimates; complications when joint products provided	Pollution control and detoxification; storm protection, water purification of forest watershed
Replacement cost ⁵⁹	Estimating the value of nonmarket ecosystem service by calculating the cost of replacing the lost or reduced service with a manmade substitute or with restoration of the ecosystem	Tends to overestimate, few studies verify conditions necessary for validity	Provision of clean water by watersheds, seed dispersal service of natural pollinators, value of coastal protection and stabilization by mangroves
Revealed preference method ⁶⁰	Information on observed travel and time expenditures for ecosystem benefits	Require large amount of data; complex when trips are multipurpose; applicable in a few contexts	Maintenance of beneficial species, productive ecosystems and biodiversity; storm protection; air quality, recreational benefits
Stated preference method ⁶¹	Using surveys to ask individuals to make hypothetical choices between different levels of environmental goods at different prices to reveal their willingness to pay for those goods	Time and cost in designing and carrying out surveys; various sources of biases such as hypothetical bias, and sampling bias	Water quality, species conservation, flood prevention, air quality

Chinese scholars have also contributed to the discussion in recent years. On the question of how ecological or NFPP forests should be valued, one paper seemingly adopts the “replacement cost” method with some modification. The paper theorizes that the compensation must exceed the cost to establish

and maintain the forestland and forests at issue so that the right-holders are sufficiently incentivized. However, considering China's relatively low economic development levels and the inherent responsibility of citizens to serve the society as a whole, the right-holders should not expect to be compensated for the full value of the ecological services provided by their forestland and forests. Therefore, a sensible compensation standard should include the following components:⁶²

- a. Initial afforestation cost
- b. Management cost
- c. Forest maintenance cost
- d. Reasonable rent for forestland

The forestland rent represents the future income that forestland right-holders would have received if converting the forestland for uses other than ecological forests where logging is prohibited. Data collected on these components from three provinces leads to the conclusion that 28.91 yuan per mu (approximately US\$68.8 per hectare) per year should be the reasonable amount of compensation that is paid to farmers and villages, or three times what is paid by NFPP.⁶³ It should be pointed out that this number probably needs

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some upward adjustment because the three types of costs and the forestland rent level have increased considerably since the time of this study (2005).

One study done in Zhejiang province uses a similar modified “replacement cost” approach, but it is different from the above study in that it uses opportunity cost (not forestland rent) as the expected return of income. According to this study, for fir forests, each mu should receive 61.6 yuan (approximately US\$146.7 per hectare); and for pine forest, 50.5 yuan (approximately US\$120.2 per hectare), to cover the initial investment, ongoing maintenance costs and expected return.⁶⁴

Another study done in Hubei province in 2007 uses the “production function method.” In comparing how different industry sectors benefited from the ecosystem in Hubei, the paper concludes that 45.52 yuan (approximately US\$108.4 per hectare) should be the average compensation standard for each mu of ecological forest in the province.⁶⁵

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IV. COMPENSATING FARMERS AND COMMUNITIES UNDER REGULATORY TAKINGS

1. The Concept of Regulatory Takings

The second rationale that supports paying compensation to NFPP-affected farmers and villages is regulatory takings of property. Most national governments possess the power of eminent domain, which allows them

to physically and compulsorily take private property for public use in order to improve the well-being of all their citizens. For this type of government taking, the law in most countries (including China) requires compensation for the loss of property sustained by the individual holder of rights to the property.

When a government regulation deprives property owners of all viable economical use of their property the effect of the regulation is similar to a physical taking of the property by the government and thus proper compensation is called for.⁶⁶ These are called “regulatory takings.” Because of the logging ban instituted by the NFPP, farmers and rural communities are prohibited from making any meaningful economic use of the forestland or trees. Consequently, it makes sense that they are entitled to fair and adequate compensation for the diminished value of the forestland and trees which has been a consequence of the NFPP.

a. The U.S. Experience

In the U.S, the judicial concept of regulatory takings was first introduced in the 1922 Supreme Court decision of *Pennsylvania Coal Co. v. Mahon*.⁶⁷ In this case, the state had enacted a statute prohibiting the mining of coal that could cause the soil to recede. When reviewing the statute at issue, the U.S. Supreme Court set up the proposition that if “regulations go too far, it will be recognized as a taking.”⁶⁸ In general, regulatory taking in the US has been defined as a government action to regulate use of individual property for the public benefit, in the absence of physical intrusion on the property that drastically diminishes its value or usefulness. However, to determine whether a regulatory taking amounts to a compensable taking under the Fifth Amendment of the U.S. Constitution, further inquiries are entailed.

Under U.S. jurisprudence, the first inquiry is to see whether the claimed regulatory taking is equivalent to the denial of “all economically beneficial or productive use of land.”⁶⁹ With respect to this type of categorical regulatory takings, the general rule is that government must provide compensation in order to avoid individual bearing of public burdens “which, in all fairness and justice, should be borne by the public as a whole.”⁷⁰

For non-categorical regulatory takings, sometimes referred to as “partial takings,” where a regulation has taken away significant, but not all, value from a piece of property, the law requires an ad hoc inquiry into the regulation and its impact.⁷¹ Whether a particular restriction of land use causes certain losses and thus requires for compensation depends largely upon the circumstances of that case.⁷²

In a later case, *Penn Central Transportation Co. v. New York City*, the Supreme Court outlined three factors to the original *Pennsylvania Coal* analysis in order to clarify whether a regulation should be considered a compensable taking when there is still some value remaining in the property.⁷³ These factors include the economic impact of the regulation on the claimant, the extent to which the regulation has interfered with distinct investment-backed interests, and the character of the government action.⁷⁴ Thus, for any regulatory action that falls short of a categorical regulatory taking, the ad hoc inquiries should be conducted within the framework crafted under *Penn Central*.⁷⁵

With respect to diminution of economic value of the property as a result of government’s regulatory act, U.S. jurisprudence requires an inquiry as to the extent of the diminution as against the remaining value of the property.⁷⁶ If such diminution is not significant enough to place a heavy burden on the property owner, the regulatory action may not give rise to a compensable regulatory taking,⁷⁷ since the property owner might be able to operate at a profit even with the regulation in place.⁷⁸

Pursuant to the state-level constitutional requirements, several states grant their residents additional protection from regulatory takings. As an extreme example, Oregon’s regulatory takings bill provides that “if a public entity enacts or enforces a new land use regulation or enforces a land use regulation enacted

prior to the effective date of this amendment that restricts the use of private real property or any interest therein and has the effect of reducing the fair market value of the property, or any interest therein, then the owner of the property shall be paid just compensation.”⁷⁹ Texas requires that the state compensate for any land use regulations that reduce property value by 25 percent or more.⁸⁰ In Florida, the state must compensate private land owners for any regulation that causes the land owner to be permanently unable to attain the reasonable, investment-backed expectations for his or her property, or bears permanently a disproportionate amount of the burden imposed by the public good.⁸¹

b. The European Experience

With increasing public awareness of the potential property rights impacts of government regulations to protect the environment, some European countries have developed regulatory takings jurisprudence, either through codified laws or judicial practice.

In Sweden, the concept of “regulatory taking” is written into the constitution, which requires compensation “to a person whose use of land or buildings is restricted by the public institutions in such a manner that ongoing land use in the affected part of the property is substantially impaired, or injury results which is significant in relation to the value of that part of the property.”⁸² Under the Swedish constitutional standard, a government regulation may be viewed as a regulatory taking if the individual property is substantially impaired or the property value is significantly reduced. These constitutional provisions have proven to carry substantial force; current legislation even allows for a property owner to force the compulsory purchase of land that experienced an “exceptional” loss in value due to restrictions on land use.⁸³

Under Swedish land law, the general principle is that compensation (based on diminishment of market value of the land) must be paid for encroachments upon current land use. Loss of value due to future earning potential does not warrant compensation. As such, planning decisions do not normally give rise to compensation claims. However, Swedish planning authorities will apply a balancing test to weigh public and private interests and deny permits if a use is deemed to be overly detrimental to property owners. In a number of cases the Supreme Administrative Court has voided prior planning decisions that were deemed to violate the test. Thereby in accordance with balancing this approach, the importance of land owners’ rights in Sweden has been affirmed.⁸⁴

In the Netherlands, the Civil Code states: “Property is the most extensive right that a person can have over an object.” Use of property is vested in the owner above all others as long as the use is “not in conflict with the rights of others and takes into consideration the limitations based on statutory rules and those of unwritten law.”⁸⁵ Similar to Swedish law, land owners have a relatively strong position with regard to compensation for diminishment of the value of land. A 2005 Dutch law guarantees the right of compensation for “damage, which cannot reasonably be left or completely left to his responsibility and for which payment resulting from purchase, expropriation or other means is not assured, or insufficiently assured.”⁸⁶ Unlike Swedish law, which does not cover loss in earnings, both capital losses and income losses may be compensated under the 2005 law.⁸⁷ Also, as under Swedish rules, Dutch law uses a relatively broad definition of those who are eligible to claim compensation. “Interested parties” may be those whose home value has declined or income has fallen as a result of a land use decision, or tenants, whether private or public parties.⁸⁸

Poland is another country with strong laws protecting land owners’ interest in case of regulatory taking. Under Polish law, if a land use plan or an issuance of a development permission “limits in an essential manner” or destroys the ability to use property as it had been previously used, the land owner may demand compensation for the actual damage or that the municipality purchase the lost interest in the

land.⁸⁹ However, when unregulated land is being used for one particular purpose with no plans for a change, and a zoning ordinance is passed that solidifies this use as the sole use of the property and prohibits any other use, the prohibition would not be considered a regulatory taking even if it may interfere with the property owner's right to develop the property.⁹⁰ That is to say, if land is currently used for forest production, a regulation that prohibits any other uses may not trigger a regulatory taking even if the "other use" may be more profitable.

Finland takes a different approach to regulatory takings jurisprudence, with more emphasis on social obligations of property owners than Poland. In general, when determining whether land use restrictions amount to a compensable regulatory taking, a proper balance should be struck between individual property interests in land and individuals' social obligations.⁹¹ Under Finnish land law, a property owner must suffer a threshold loss from government land use restrictions before such government action can be considered a regulatory taking that deserves compensation. Such thresholds vary depending on the legislation, including the owner's inability to use the land "in a manner generating reasonable return,"⁹² or his or her sustaining a "significant inconvenience."⁹³ Moreover, if the restrictions are not generally or non-discriminatorily applied to the general public, they may amount to a regulatory taking.⁹⁴

The national law in China does not appear to recognize the concept of "regulatory takings." The Land Management Law, the most comprehensive law on compulsory land expropriations, deals with physical takings of properties. Neither the Forestry Law nor the more general Property Law contains any explicit or implicit reference to the regulatory taking of property.

2. Regulatory Takings in China

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But there is certainly room for legislative change. Generally, the law distinguishes two types of land takings in China. One is called land expropriations (zheng shou) and the other is land requisition (zheng yong). The following table lists the distinctions of the two:⁹⁶

	Expropriation	Requisition
Nature	Compulsory	Compulsory
Permissible purpose	Public interest	Public interest and typically for emergency situations such as disaster relief or war
Affected rights	All rights including ownership converted to state ownership	Use rights only, without changing ownership
Time period	Permanent	Temporary, and requisition ends when government returns the use of the property to owner
Compensation?	Yes (mostly lump sum payment)	Yes, especially if the property cannot be restored to original state
Example	Government expropriates a farmer's house and residential land to build a highway	Government uses a farmer's house to store sand bags for an upcoming flood emergency

Both the Land Management Law and the Property Law require that right-holders be compensated in the case of land requisition. It can be argued that implementation of the NFPP bears a great deal of resemblance with “requisition,” except the part about an “emergency situation.” The NFPP can be viewed as a restrictive land use regulation that substantially impairs the value of forestland, just like the many western countries discussed in the early section. Thus the law should allow claims for compensation. Several scholars have made forceful arguments to modify the land requisition law so that the NFPP-affected farmers can seek compensation under the existing law.⁹⁷

Regardless of the theoretical discussion, at the provincial level, there are several forestry regulations that have essentially adopted “regulatory takings.” In Guangdong province starting in 1999, the provincial forestry bureau has designated forests as provincial level “ecological forests” (similar to NFPP forests designated by the SFA) with a logging ban implemented. Guangdong set up a special PES fund to pay for a broad range of compensation, according to a 2001 provincial regulation:⁹⁸

The ecological public-interest forest compensation fund is used for:

1. *Parties to be compensated – forestland operators or forest owners who have suffered economic losses because their forests are designated as provincial ecological public-interest forests and subject to a logging ban.*
 - a. *if contracted mountain or responsibility mountain belongs to a farm household, the compensation should go to the farm household*
 - b. *if forestland and forests have not been contracted to farm households or leased out, the compensation should go to village collectives or village teams*

...

The above language, considered a binding law in Guangdong province, is the equivalent of “regulatory takings.” It not only explicitly recognizes the diminished economic value (“the economic losses”) suffered by farmers or villages whose rights to forests and forestland are severely impaired by the logging ban, but also calls for compensation to make up the economic losses. In particular, the regulation coined the term “compensation for economic losses” to refer to this payment.

Additionally, this Guangdong provincial regulation specifies that at least 75 percent of this fund will be used to compensate farmers and villages for the economic losses caused by the logging ban. The remaining 25 percent is for maintenance and management of such ecological forests. Such a distinction has never been made by the national regulations on ecological or NFPP forests. As the bulk of the fund (75 percent) pays farmers and villages directly for the impairment of their forestland rights, it will be a huge incentive for them to support the program for the long term.⁹⁹

At the very beginning (1999), the annual compensation standard was 2.5 yuan per mu. It was gradually increased and now it stands at 12 yuan per mu. Some municipalities, especially the wealthy ones, have chosen to allocate additional local revenues to increase the compensation level. For example, in Guangzhou city, the standard in 2009 was 41 yuan per mu. In Dongguan city, ecological forests that are owned by village collectives and farmers receive 100 yuan per mu on top of the 12 yuan provided by the provincial fund. Since 1999, 5.4 million farm families and 14,000 villages have benefited directly from this program.¹⁰⁰

Besides Guangdong, Zhejiang province appears to have established the compensation principle for forestland rights being undermined or diminished by ecological protection programs. In a 2005 provincial

regulation, Zhejiang, like Guangdong, made the important distinction between “compensation for losses” and payments for management or maintenance operations. The former specifically includes the payment for economic losses suffered by forest farmers or village collectives due to the logging ban. The latter refers to the ongoing costs for cultivating and maintaining ecological forests. In Zhejiang, the “compensation for losses” from the provincial fund to farmers or villages is 5 yuan per mu each year.¹⁰¹ In some of the municipalities, local governments have chipped in and provided extra funding for these losses. For instance, the annual compensation in Ningbo city has reached 11 yuan per mu.¹⁰²

Fujian is another province that recognizes that rights being undermined due to a logging ban are entitled to compensation, and that this compensation is separate from the costs of forest maintenance and monitoring. A 2007 Fujian provincial regulation explains how compensation should be determined and allocated to forestland and forest right-holders under different tenure arrangements – state ownership, collective ownership, ownership by farmers, and use rights by farmers. The regulation creates the term “compensation for right-holders,” which refers to the payments compensating for the losses suffered by farmers and villages due to logging bans. The regulation further specifies that at least 50 percent of the provincial ecological compensation fund should be dedicated to “compensation for right-holders” for collective-owned forestland.¹⁰³

It should be noted that ongoing payments are not typical under regulatory takings, but because there is uncertainty on how long the NFPP will last, the payments described above are structured as annual installments.

Guangdong, Zhejiang and Fujian represent the three provincial jurisdictions in China with the most highly developed rules and practices on regulatory takings of forestland. They are still a minority in China, and strikingly, none of the three provinces belongs to the seventeen provinces with national NFPP projects. One plausible explanation is that these three provinces come from the wealthiest coastal regions of China and their local governments simply have more resources than interior NFPP provinces (especially the Yellow River and Yangtze River upstream regions). But these provincial regulations and resulting practices have brought about significant environmental improvements without sacrificing farmers’ rights,¹⁰⁴ and should be seriously considered as successful models by other parts of China as well as the central government.

3. Compensation Standard Under Regulatory Takings

Once a government regulation is viewed as a regulatory taking of private properties, the next question is the amount of compensation. A number of terms – “just compensation,” “reasonable compensation,” or “fair compensation” – are widely used in different country settings. A brief review here is helpful.

In the USA, where compensation is due, the constitutional mandate of “just compensation” applies. Typically, just compensation is represented by the market value of the property taken. The following is a widely accepted definition:¹⁰⁵

Market value is the amount in cash, or on terms reasonably equivalent to cash, for which in all probability the property would have sold on the effective date of the appraisal, after a reasonable exposure time on the open competitive market, from a willing and reasonably knowledgeable seller to a willing and reasonably knowledgeable buyer, with neither acting under any compulsion to buy or sell, giving due consideration to all available economic uses of the property at the time of the appraisal.

In assessing a property's market value, several principles are routinely followed by the U.S. courts:¹⁰⁶

- **Highest and Best Use** – Fair market value is normally based on the value of the property as put to its most profitable use. This rule mimics real market behavior because a real buyer would consider the property's highest and best use to arrive at a fair transaction price. Existing restrictions such as zoning should be taken into account.
- **Benefit Offsetting** – In the case of a partial taking, the compensation is generally offset by any benefit conferred by the regulation. For example, if a new road is built through part of a property, the compensation due to the property owner is offset by the enhanced value to the property as a result of the new road.
- **Replacement Value** – American courts have occasionally used the cost of replacement as an alternative to fair market value when the market value of the property is not readily available. This is similar to the “replacement cost method” used to valuating environmental services mentioned in the earlier section.

In Finland, the determination of compensation is governed by the Expropriation Act, which spells out three aspects of compensation. The first is “object” compensation, which is the fair market value for the property or property rights being taken. The second is “severance” compensation, which pays an owner for the nuisance caused by the loss of rights in situations when only a portion of the property is the subject of expropriation. Finally, “damage” compensation reimburses owners for consequential damages and expenses incurred due to the expropriation, such as moving costs or loss of profits.¹⁰⁷

Poland also applies its constitutional mandate of “just compensation”¹⁰⁸ to regulatory takings. Polish law requires that if a land use plan is determined as a regulatory taking, government must pay compensation for the actual damage or purchase the lost interest in the land.¹⁰⁹ Although the law does not provide the formula for calculating the purchase price, the market value of the property before it became blighted is generally used.¹¹⁰ If the injured owner instead chooses to limit his claims to monetary compensation, it is limited to “actual damages” to the property, excluding hypothetical damages such as lost profits.¹¹¹

Because the Chinese national law does not recognize the concept of regulatory takings, there is no clear guidance on how the compensation for NFPP-affected forestland and forests is determined. However, the general compensation principles under land takings law in China are instructive, which typically consists of three components:¹¹²

- Compensation for land;
- Compensation for standing crops and fixtures; and
- Resettlement subsidies.

The “compensation for land” represents the bulk of the total compensation. For farmland, the average annual yield of the land is determined at first. The land for compensation can typically go up to 30 times of the average annual yield. Compensation for standing crops and fixtures is often calculated based on a pre-determined formula (with replacement cost for different types of crops and fixtures). Resettlement subsidies come into play when farmers lose most or all of their land, and their livelihood cannot be sustained at their original location.

Besides the above formula, the central government recently adopted an additional “no worse-off” rule. That is, compensation packages offered in land takings should at least maintain affected people's original

standards of living. This is significant because for many years, compensation was capped at 30 times the average annual yield of the land.¹¹³ This new rule means that this cap can be ignored if maintaining affected peoples' living standard calls for compensation more than 30 times the average annual yield.

On a macro level, the above principles can be applied to the NFPP-affected forestland without much difficulty. "Compensation for land" could represent the value of forestland use rights that are reduced or impaired. Farmers are prohibited from not only harvesting existing trees but also from developing the land into higher-value uses (e.g., fruit trees). These restrictions have extinguished all substantial economic value associated with farmers' use rights to the land, and this should be compensated properly. "Compensation for standing crops and fixture" could refer to the existing trees and plants on NFPP forestland. That value could be easily calculated as market and transaction information is readily available to calculate the fair prices. Finally, if a farm family largely relies on forestland for livelihood and if most or all land is covered by the NFPP, there would be a strong presumption that the family needs to be relocated and resettled to a new location and be given sufficient resources so that it can maintain the original standard of living. In that case, "resettlement subsidies" should apply.

One important note here is that most of the compensation schemes discussed above are distributed as lump sum payments. Because there is still some uncertainty on how long the NFPP will continue, it might make sense to structure the payments as annual installments, which is consistent with the existing practices at the central and in some cases, local levels in China. This should not change the overall calculation or affect the total amount that farmers will receive, but the payment would be spread out as long as the NFPP is in effect.

There are several other compensation methods currently proposed by researchers.¹¹⁴ The purpose of these methods is to make sure that affected farmers and other right-holders are fairly and fully compensated for their losses. It is clear that affected farmers should not be required to provide benefits and services to the entire society without being compensated.

Lastly, the Chinese government should develop procedural safeguards that are crucial to achieving the goal of fairness and rule of law. China should resist the temptation to announce a simplistic and fixed national compensation formula, such as the present NFPP compensation scheme under which 10 yuan is paid per mu each year. It is necessary and useful for the central government to lay out guiding principles and payment structure, but it is equally important to allow flexibility and especially room for negotiation between the government and affected farmers or communities. Basic procedural safeguards should include the right to be fully informed regarding the selection and designation of NFPP areas, the right to participate in and influence decision-making of the government on the selection of NFPP areas and proper compensation standard, as well as the right to appeal before an independent tribunal. Otherwise, a lack of procedural safeguards could lead to abusive, corrupt and harmful practices against farmers' forestland rights.

V. PRELIMINARY RECOMMENDATIONS

To ensure that the conservation is achieved for the long term and that affected farmers and other right-holders are fairly compensated, China needs to take on a series of challenges involving changes of law, policy, and practices.

One of the highest priorities for the SFA is to complete the collective forestland tenure reform in the next several years, as mentioned in the beginning of this paper. The reform is about the distribution of

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more than 180 million hectares of forestland to individual farmers, who then enjoy secure, 70-year rights to the land and forests.¹¹⁵ The main purpose of the reform is to make farmers true “owners” of forestland and forests, thus motivating them to make long-term investments in land, which promotes the development of the forest sector, and improves the overall ecological qualities of China.¹¹⁶ Recent reports indicate that the reform has resulted in significant and positive benefits.¹¹⁷

The effectiveness and ultimate objectives of this reform, however, could be seriously undermined by the current NFPP. Even if farmers receive forestland under the reform with formally-issued forestland certificates to confirm their 70-year rights, it would mean very little to them if the allocated forestland is covered by the NFPP. Because the selection and designation of NFPP areas are done unilaterally by the government, farmers have no choice but to comply. Since farmers are prohibited from harvesting trees and using the land for other purposes,¹¹⁸ and they are not compensated, it would serve as a deterrent to their future investments in the forestland. Without a fair and consistent compensation structure in place, the NFPP will greatly weaken farmers’ confidence in the security of their rights. The fear of insecurity will be contagious, even impacting farmers whose forestland is not currently covered by the NFPP. The fear of economic losses disincentivises farmers from making investments.

This is a dilemma that the Chinese government must resolve. And the only sensible solution is to consider legal and policy changes allowing proper compensation to affected farmers.

The primary focus of this paper has been to discuss the implications of the two approaches, PES and regulatory takings, as applied in China. But, it should be noted that there are other alternatives that could also be viable options in China. The most notable one is the mechanism currently being used in Mexico, Costa Rica, Ecuador, and other Latin America countries, which can be described as a modified PES scheme involving multiple-use community forest management. Farmers and communities enjoy greater rights and access to the forests and forestland under this approach than under the NFPP

Local people and communities can generate income and satisfy some livelihood needs through picking plants such as mushrooms or herbs, acquiring animal products, or under well-controlled management practices, sustainably harvesting timber and fuelwood. Under such an alternative, the PES payments are adjusted and reduced accordingly so that it makes more affordable for the government to sustain the desired programs. There is ample data showing that the multiple-use community conservation scheme both provides environmental services and enables government to implement PES incentives programs that can reach a much larger population with the available resources.¹¹⁹ This “blended” approach can be an attractive option if the right conditions are present.

That said, the following is a series of preliminary recommendations for Chinese policy-makers:

1. Develop both national and regional PES schemes to create income flows for NFPP-affected farmers and communities

As discussed above, the NFPP is a massive PES program by itself with a fatal flaw – there is no “payment” for “environmental services.” The current “compensation” pays for only the cost for maintaining and managing NFPP forests. Despite the enormous ecological benefits provided for the past twelve years, tens of millions of affected farm families are compelled to offer environmental services for the nation. This violates the basic principle of equity that should be present in PES.

There are a number of successful PES models that China should take heed of. Setting up PES schemes based on major well-defined river basins is worth exploring. The previously discussed Fujian experience, in which downstream regions compensate for the actions of their upstream counterparts, could be expanded to the entire Yangtze River or the Yellow River. This will require much political maneuvering and coordination, but given the potential size of the benefits involved, it will be an extremely valuable and meaningful achievement.

In so doing, three points need to be kept in mind. First, the involvement of the private sector needs to be encouraged. If proper financial incentives are provided, there will be an immense amount of interest from the private sector in investing in NFPP forests. Additionally, the “Environmental Service Certificates” model, traded among the private sector in Costa Rica, is another way to attract private-source funding. Regardless, the private sector could enhance efficiency and promote public participation for the whole program if proper regulations and enforcement are in place.

Second, expertise needs to be developed on the valuation of environmental benefits and services. Because the Chinese government has not wholly embraced the idea of PES, much of the limited discussion on valuation has remained on paper. It will require multidisciplinary studies from economists, ecologists, environmental scientists and other professionals in China to answer this important question.

Finally, adequate mechanisms are needed to ensure that the payments go directly to farmers and rural communities who provide ecosystem services. PES programs are not a revenue source for the local government. Mutually beneficial and market-based contracts between consumers of ecosystem services and the suppliers of these services are needed. If farmers and rural communities cannot enjoy the financial return, any otherwise well-designed PES program is likely to fail.¹²⁰

2. Improving the present legal regime to incorporate “regulatory takings”

There are two possible policy avenues to achieve a more optimal system. First, the current land law could recognize the concept of “regulatory takings” as a new form of land takings. It would apply whenever a government program or regulation substantially restricts the use and diminishes the economic value of a property. If the claimed regulatory taking is equivalent to the denial of all or most economically beneficial or productive use of land, then the government is liable. This is already the case for the ecological forest programs in provinces like Guangdong and Zhejiang, and the national government should seriously consider adopting the same approach.

As a second alternative, the concept of “regulatory takings” could be brought within the existing law on “land requisition” (zheng yong). The only change needed is to broaden the purpose of land requisition (currently for emergency situations only at this moment) so that land takings through government regulations can fall within its scope. With this change, because the NFPP impairs only the use rights of land without affecting ownership for a limited period of time, such a type of regulatory taking can conceptually fit well under the land requisition law.

Some reasonable cost estimate should be carried out to measure the amount of total payment in relation to the available budget or funding. Two factors are in play here. One is whether the payment is made in a one-time lump sum or in a periodic (such as annual) fashion. As indicated earlier, the effective length of the NFPP is not entirely clear. Thus it is reasonable to set up an annual payment structure which should ease the budgetary burden on the government. The second factor is whether to allow retroactive compensation to “catch up” the lost payment before the new rules are adopted. Strong arguments can be made for retroactive payments, but this will substantially increase the payout amount. Thus, this will be a legal, as well as a financial question for the government.

After regulatory takings are recognized by the formal law, the next step is to determine the proper amount of compensation. Today the compensation standard in land takings is one of the most controversial and hotly-debated issues within the central government and policy community of China. As a matter of fact, the often criticized Land Management Law that governs land takings is currently under amendment, and the debate will likely continue.¹²¹ It is outside the scope of this paper to detail the possible changes of this important legislation, but two fundamental principles should be kept in mind.

One is to use fair market price as the basis for any compensation package. As China’s land and timber market is rapidly developing, transaction and price information is readily available and should serve as the benchmark for the determination of compensation. This approach yields the most reasonable and acceptable results, which have been the case in most modern and developed countries. China is no exception.

The other rule is to strictly comply with “no worse-off” principle so that affected people can maintain the same standard of living after the takings. This means that the government needs to appropriate sufficient resources to guarantee affected people’s long term livelihood, especially ensuring their earning abilities in a new environment when a resettlement is triggered. NFPP-affected farmers and communities are among the poorest in the nation, and it would be an enormous injustice to take their mountains and forests away without adequate compensation.

3. Reforming and increasing the compensation standard under the current NFPP regulation

To accomplish either of the two broad reforms proposed above demands significant policy discussion and political will, and the transition could take years if not decades. The fall-back solution would be carrying out a smaller-scale of change targeted at the present NFPP compensation structure.

Based on the discussion in earlier sections, the recently announced 10 yuan per mu standard falls significantly short of what is fair and reasonable. The first item on the agenda is to create a new category of compensation for the economic losses and diminished value suffered by farmers due to the logging ban. Again, the experience in Guangdong and Zhejiang can be valuable in regard to paying additional compensation for farmers’ economic losses or impaired rights. This change requires neither a formal action by the national legislature nor comprehensive coordination among dozens of provinces in one major river basin. As such, the SFA may face fewer obstacles within the central government.

It is understandable that the SFA is devoting most of the NFPP funding to salvaging the struggling state-owned forest industry, as hundreds of thousands of jobs are at stake. But the tens of millions of poor farm families that have been relying upon forestland as an important source of livelihood cannot be ignored. It is irrefutable that NFPP-affected farmers have suffered substantial and widespread income losses. No matter how great an ecological success the NFPP program becomes, it should never become a vehicle to impoverish and potentially devastate numerous rural communities.

It might not be realistic to increase the new compensation to an adequate level overnight, given that the SFA has limited say in national budgetary decisions made largely by the Ministry of Finance. The key is to acknowledge the problem and start paying something right now, and then gradually increase it over time as more financial resources become available.

VI. CONCLUSION

Today, China is suffering the worst rural-urban disparity in its modern history. According to official data, an average member of a farm household had a yearly income of about US\$770 in 2009 (barely over US\$2 a day), while an urban resident made a yearly income of more than 3.3 times greater (approximately US\$2,600). Moreover, there are 36 million rural people living under US\$0.50 a day, most of who live in the remote and interior regions that often overlap with the designated NFPP zones.¹²² These people traditionally have been dependent upon mountains and forests for their basic livelihood. Current NFPP policies are likely driving them further into poverty.

If only using the most conservatively estimated amount of compensation (28.91 yuan per mu) that should be paid to farmers for environmental services provided, the NFPP-affected farmers and communities could receive a total of 15.3 billion yuan (approximately US\$2.3 billion) every year.¹²³ This flow of funding could go a long way and make some real difference in these under-developed rural regions.

It appears highly desirable, from both a public policy and economic standpoint, for the Chinese government to seriously assess these problems and consider adopting meaningful solutions. Regardless of the law or theory to apply, the focus should be on making the NFPP a sustainable ecological program without causing massive injustice and worsening poverty in rural China.

ENDNOTES

¹ Zhang Lei (Director General of Rural Forestry Reform Division, the State Forestry Administration of China). 2010. Speech made at the International Conference on Forest Tenure and Regulatory Reforms in Beijing. September 24.

² For a detailed discussion on collective ownership, see Roy Prosterman et al. 2007. *One Billion Rising – Law, Land & the Alleviation of Global Poverty*. Leiden University Press, 2007, p277-292.

³ Zhu Keliang, et al. 2009. *Secure Land Rights as a Foundation for Broad-based Rural Development in China – Results and Recommendations from a 17-province Survey*. National Bureau of Asian Research Special Report #18, November, p6-8.

⁴ Property Law, article 59.

⁵ The Central Committee and the State Council. 2003. *Decision on Speeding up Forest Development* (Central Document No. 9).

⁶ CCP Central Committee and State Council. 2008. *Opinion on Pushing Forward Collective Forest Rights Reform on a Full Scale*. June 8.

⁷ Rural Land Contracting Law, article. 16.

⁸ See Zhang Lei's speech, footnote 1.

⁹ Liu Jianguo et al. 2008. *Ecological and Socioeconomic Effects of China's Policy for Ecosystem Services*, Proceedings of the National Academy of Sciences (U.S.), Vol. 25, No. 28, p9477-9482. July 15.

It is irrefutable that the NFPP-affected farmers have suffered substantial and widespread income losses. No matter how great an ecological success the NFPP program becomes, it should never become a vehicle to impoverish and potentially devastate numerous rural communities.

- ¹⁰ SFA. 2000. National Planning Commission, et al. *Notice on Carrying Out Natural Forest Protection Program in Priority State-owned Forest Areas in Yangtze River Upper Region, Yellow River Upper & Middle Region, Northeastern Region and Inner Mongolia*.
- ¹¹ Lei Jiafu (Deputy Director General of SFA). 2007. Speech made at National NFPP Field Conference held in Lijiang, Yunnan. November 20.
- ¹² SFA. 2007. *Notice on Drafting Implementation Plans on Natural Forest Protection Project Counties (Bureaus)*. February 8. See also SFA. 2001. Classification and Designation Method of Public-interest Forests. March.
- ¹³ For the government data on the amount of NFPP forestland, it appears that wetland, shrub land and even waste land within ecologically sensitive regions are counted as “forestland”. Thus the total size of “forestland” for the purpose of the NFPP – currently counted as 285 million hectares – is much larger than the size of the real forestland which is 195 million hectares based on the most recent SFA data.
- ¹⁴ Yao Changyi, Liu Jinfu, et al. 2008. Field Research Report on Regional Policies regarding Payment for Forest Ecosystem Services. Published by Development Planning & Financial Management Division of SFA. Available online at <http://www.gzf.gov.cn/info.asp?Newid=2416>.
- ¹⁵ Id.
- ¹⁶ Id. See also Jia Zhibang (Director General of SFA). 2010. Speech at National Forestry Division and Bureau Directors Conference. January 21. Available online at <http://www.forestry.gov.cn/ZtAction.do?dispatch=content&id=335236&ztName=2010tjhy>.
- ¹⁷ SFA. 2006. *Results on the Fifth Survey on National Forestry Resources*. September. Available at <http://www.forestry.gov.cn/portal/swzny/s/758/content-102823.html>.
- ¹⁸ Beijing Youth Daily. 2004. *SFA Boasts Annual Reforestation Achievements Exceeding more than 1 percent of the Country's Territory*. January 14. Available at <http://www.ahnw.gov.cn/2006nwkw/html/200401/percent7B6DBD2EAA-2B91-4067-A6F2-97461B1EA762percent7D.shtml>.
- ¹⁹ People's Daily. 2002. *Implementing the NFPP and Pushing Fundamental Reforms of the Forestry Sector*. October 14. Available at <http://www.envir.gov.cn/info/2002/10/1014026.htm>.
- ²⁰ See generally, Wu Yaqiong & Wang Jian. 2009. *Problems of Reform Development of National Forest Farms*. China Forestry Economy, Vol. 97(4), p45-47. July; Yi Aijun & Liu Jianchan, *Discussion on the Policy System Problems and Countermeasures of China's State-owned Forest Farms Out of Poverty*. Journal of Anhui Agricultural Science, Vol. 38(9), p4860-4861.
- ²¹ For the sake of simplicity and consistency, the exchange rate of approximately US\$1 = 6.7 yuan is used here throughout.
- ²² Ministry of Finance & SFA. 2004. *Central Management Method of Subsidy Funds for Forestry Ecological Service Programs*. October 21.
- ²³ Ministry of Finance & SFA. 2010. *Central Management Method of Subsidy Funds for Forestry Ecological Service Programs*.
- ²⁴ The author's fieldwork was carried out from December 2009 to February 2010 in Kaiyang County (Guizhou), Changwu County (Shaanxi), Yulong County (Yunnan), and Shuangbo County (Yunan).
- ²⁵ SFA. 2006. Meeting on Poverty Alleviation Work on State Forest Farms. <http://www.forestry.gov.cn/portal/main/s/1183/content-123279.html>. September.
- ²⁶ Id.
- ²⁷ SFA. 2010. 2009 Annual Report on Forestry Development of China. See <http://www.forestry.gov.cn/portal/main/s/62/content-437412.html>. August.
- ²⁸ Yang Lidan. 2004. *A Case Study of Taijiang County of Guizhou Province regarding the NFPP and Payment for Ecological Services*. Journal of Mountain Agriculture & Biology (China), Vol 23(2), p161. In another study done in a different county of Guizhou province, the per capita income reduction due to the NFPP logging ban is 49 yuan. See Qi Xinmin, Wan Delu & Li Shixiu. 2003. *Problems and Solutions for the Implementation of the NFPP in Collectively-owned Forestland in Guizhou*. Journal of Mountain Agriculture & Biology (China), Vol 22(4), p339-344.
- ²⁹ The rural per capita income in Guizhou province in 2004 is 1,722 yuan (approximately US\$257). http://www.stats.gov.cn/was40/gitjj_detail.jsp?channelid=4362&record=198
- ³⁰ Yang Lidan, footnote 28, at p161.
- ³¹ Xu Wei. 2001. *Analysis of the NFPP Impact on Sichuan Rural Communities*. Reform of Economic System (China), Vol 1, p47-48.
- ³² Qiao Rongfeng, Gao Jinyun & Zhang Anlu. 2006. *Effect and Policy Suggestions of the NFPP on Affected Farmers' Income in Hubei, Sichuan & Chongqing*. Research of Agricultural Modernization (China), Vol. 27(1), p40-43.

- ³³ See generally, Wang Quandian. 2008. *Policy Mechanisms and Compensation Standards regarding Public-interest Forests and Payment for Ecological Services*. Zheng Fa Lun Cong (China), Vol. 2. April; Gui Ladan & Zhang Weiqiang. 2007. *Policy Analysis of the Compensation System for Ecological Forests in Guangdong Province*. Northwest Population (China), Vol. 28(4), p54-57.
- ³⁴ Also known as “payment for ecosystem services.”
- ³⁵ See generally James Salzman. 2005. *Creating Markets for Ecosystem Services: Notes from the Field*. New York University Law Review, Vol. 80 p870; Stefano Pagiola, Agustin Arcenas and Gunars Platais. 2005. *Can Payments for Environmental Services Help Reduce Poverty? An Exploration of the Issues and the Evidence to Date from Latin America*. World Development, Vol. 33, Issue 2, p237-253. February.
- ³⁶ World Bank. 2008. Forests Sourcebook, p85.
- ³⁷ See Stefano Pagiola, fn 35; see also Perrot-Maître, D. 2006. *The Vittel payments for ecosystem services: a “perfect” PES case?* International Institute for Environment and Development, London, UK.
- ³⁸ World Bank. 2008. Forests Sourcebook, p86.
- ³⁹ Id. at 90.
- ⁴⁰ Id. at 88-89.
- ⁴¹ See J.M. Rodriguez Zuniga. 2003. *Paying for Forest Environmental Services: the Costa Rican Experience*, Unasylva, Vol. 54, p31-33; Alexander Pfaff et al, *Payments for Environmental Services: Empirical Analysis for Costa Rica*. 2008. Terry Sanford Institute of Public Policy Working Papers Series. March.
- ⁴² Li Wenhua et al. 2006. *Research Status and Trends on Payment for Forestry Ecological Services*. Journal of Natural Resources (China), Vol. 21(5), p679-680. September.
- ⁴³ The total size of the forestland is based on the official report of the SFA in 2010 (available at <http://www.forestry.gov.cn/portal/main/s/65/content-326341.html>). The percentage of collectively owned forestland is according to an SFA's nationwide forest resources survey completed in 2003 (available at <http://finance.sina.com.cn/g/20050704/1512175179.shtml>).
- ⁴⁴ Forestry Law, article 8.
- ⁴⁵ Implementation Regulation of Forestry Law, article 15.
- ⁴⁶ Gu Zhongyang & He Lu. 2009. *Ten-year's Grains for Green Program Benefits 124 Million Farmers and Reforested More than 400 Million Mu*. People's Daily. September 17. Among the 26.9 million hectares of new forest, 9.3 million hectares comes from conversion of arable land, 15.8 million hectares from afforestation of waste land or mountain, and 1.8 million hectares from hillside closure and cultivation.
- ⁴⁷ Ministry of Finance & SFA. 2010. *Central Management Method of Subsidy Funds for Forestry Ecological Service Programs*.
- ⁴⁸ Liu Wei. 2005. *Study on the Payment for Environmental Services regarding Guangxi Natural Protection Zone's Ecological Public Interest Forests*. Guangxi University Journal.
- ⁴⁹ Xiao Jianmin. 2004. *A Study on Miyun Reservoir Public-interest Forests*. Beijing Forestry University journal; Zhang Jialai et al. 2007. *Compensation Standard for Forests' Ecological Values in Hubei*. Forestry Science, Vol. 43(8), p127-133; Chen Jie et al. 2002. *Study on Ecological Public Interest Forest Compensation Issue in Fujian*. Forestry Economic Problems, Vol. 22(6), p357-359; Yang Yunxian et al. 2008. *Study on Payment for Public-interest Forests' Ecological Benefits: the Case Study of Tonggu County of Jiangxi*. Forestry Economy, Vol. 2008(2), p49-52.
- ⁵⁰ Fujian Provincial Government. 2007. *Notice on Ecological Benefits Payments by Downstream Regions to Upstream Regions*. April.
- ⁵¹ Daily GC. 1997. *Nature's Services: Societal Dependence on Natural Ecosystems*. Island Press, Washington, D.C. See also Turner Fisher. 2008. *Ecosystem services: classification for valuation*. Biological Conservation, Vol.141(5), p1167-1169.
- ⁵² Millennium Ecosystem Assessment. 2005. *Biodiversity Synthesis Report*. World Resources Institute, Washington, D.C.
- ⁵³ R Costanza et al. 1997. *The Value of the World's Ecosystem Services and Natural Capital*. Nature, Vol.387, p253-260.
- ⁵⁴ Ian Bateman. 2010. *Economic Analysis for Ecosystem Service Assessments*. CSERGE Working Paper EDM 10-10. May. Available at http://www.uea.ac.uk/env/cserge/pub/wp/edm/edm_2010_10.pdf.

- ⁵⁵ Table adapted from Ian Bateman, fn 54 and Kerry Turner et al. 2010. *Ecosystem Valuation*. Annals of the New York Academy of Science, Vol. 1185, p84-90.
- ⁵⁶ C.M. Peters, et al. 1989. *Valuation of an Amazonian Rainforest*. Nature, Vol. 339, p655–656; R Godoy et al. 1993. *A Method for the Economic Valuation of Non-timber Forest Products*. Econ Bot, Vol. 47, p220–233; R. Costanza, et al. 1989. *Valuation and Management of Wetland Ecosystems*. Ecol. Econ., Vol. 1, p335–361.
- ⁵⁷ Also known as dose-response technique, see GM Ellis et al. 1987. *Valuing the Environment as Input*. Journal of Environmental Management, Vol. 25, p149–156; EB Barbier. 2007. *Valuing Ecosystem Services as Productive Inputs*. Econ Policy, Vol. 22, p177–229; G. Acharya, et al. 2000. *Valuing Groundwater Recharge through Agricultural Production in the Hadejia-Nguru Wetlands in Northern Nigeria*. Agric. Econ, Vol. 22, p247–259.
- ⁵⁸ W.N. Adger, et al. 1995. *Total Economic Value of Forests in Mexico*. Ambio, Vol. 24, p286–296. Also see M. Rosado et al. 2000. *Combining Averting Behavior and Contingent Valuation Data: An Application to Drinking Water Treatment*. FEUNL Working Paper no. 392, available at SSRN: <http://ssrn.com/abstract=880458>.
- ⁵⁹ C. Hougner, et al. 2006. *Economic Valuation of a Seed Dispersal Service in the Stockholm National Urban Park, Sweden*. Ecol. Econ, p364–374; S. Sathirathai et al. 2001. *Valuing Mangrove Conservation in Southern Thailand*. Contemporary Economic Policy, Vol. 19, p109–122.
- ⁶⁰ NE Bockstael. 2006. *Environmental and Resource Valuation with Revealed Preferences: a Theoretical Guide to Empirical Models*. The Economics of Non-market Goods and Services, Vol. 7. Springer; B.H. Day, et al. 2007. *Beyond Implicit Prices: Recovering Theoretically Consistent and Transferable Values for Noise Avoidance from a Hedonic Property Price Model*. Environmental and Resource Economics., Vol. 37(1), p211–232.
- ⁶¹ Also known as the contingent valuation method, see RC Carson et al. 2003. *Contingent Valuation and Lost Passive Use: Damages from the Exxon Valdez Oil Spill*. Environmental and Resource Economics, Vol. 25(3), p257–286; W Adamowicz et al. 1994. *Combining Revealed and Stated Preference Methods for Valuing Environmental Amenities*. Journal of Environmental Economics and Management, Vol. 26(3), p271–292; R.C. Mitchell. 1989. *Using Surveys to Value Public Goods: The Contingent Valuation Method*. Resources for the Future, Washington, D.C.
- ⁶² Wang Yu. 2005. *Calculation of Compensation Standard for Ecological Public Interest Forests*. Qiu Suo, p10-12. May.
- ⁶³ Id. at 196.
- ⁶⁴ Zheng Lifa, et al. 2001. *Thoughts on Establishing Payment for Ecological Services for Forests*. Forestry Economy (China), Vol. 2001 (10), p38-41.
- ⁶⁵ Zhang Jialai et al. 2007. *Compensation Standard for Forests' Ecological Values in Hubei*. Forestry Science, Vol. 43(8), p127-133.
- ⁶⁶ For example, the U.S. Supreme Court ruled that a legislative act that proscribed building on property within certain coastal zones deprived the owner of all economically viable use and therefore constituted a compensable regulatory taking, *Lucas v. South Carolina Coastal Council*, 505 U.S. 1003 (1992).
- ⁶⁷ *Pa. Coal Co. v. Mahon*, 260 U.S. 393 (1922).
- ⁶⁸ *Pa. Coal*, 260 U.S. at 415.
- ⁶⁹ *Lucas v. S.C. Coastal Council*, 505 U.S. 1003, 1015 (1992).
- ⁷⁰ *Armstrong v. United States*, 364 US 40, 49 (1960).
- ⁷¹ *Tahoe-Sierra Preservation Council, Inc. v. Tahoe Regional Planning Agency*, 535 U.S. 302, 122 (2002).
- ⁷² *Penn Central Transp. Co. v. New York City*, 438 U.S. 104, 124 (1978).
- ⁷³ Id.
- ⁷⁴ Id. at 124.
- ⁷⁵ *Tahoe-Sierra Preservation Council, Inc. v. Tahoe Regional Planning Agency*, 535 U.S. 302, 122.
- ⁷⁶ See *Palazzolo v. Rhode Island* (2001), 533 U.S. 606, in which a regulation precluding use of fill on wetlands while permitting land owner to build substantial residence on uplands portion of tract did not amount to deprivation the land owner of all economic use of entire parcel. See also *Keystone Bituminous Coal Assoc. v. DeBenedictis*, 480 U.S. 470 (1987), in which a regulation requiring 50 percent of the coal beneath certain surfaces be kept in place to provide surface support was not found to have triggered a regulatory taking.

⁷⁷ *Keystone*, at 493.

⁷⁸ *Id.* at 496.

⁷⁹ Or. Rev. Stat. § 197.352 (2004).

⁸⁰ Daniel Cole. 2002. *Pollution and Property: Comparing Ownership Institutions for Environmental Protection*. Cambridge University Press, p. 272.

⁸¹ This law is known as the Bert Harris Property Protection Act in Florida, see Florida Statute title VI (70.001).

⁸² Regeringformen [RF] [Constitution] Art. 18 (Sweden).

⁸³ Thomas Kalbro. 2007. *Compensation Rights for Reduction in Property Values Due to Planning Decisions in Sweden*. Washington University Global Student Law Review, Vol. 6, p27, 31.

⁸⁴ *Id.* at 29-30.

⁸⁵ Burgerlijk Wetboek [Civil Code] bk. 5, art. 1 (Netherlands).

⁸⁶ Wet op de Ruimtelijke Ordening [Spatial Planning Act] art. 19 (Netherlands).

⁸⁷ See Fred Hobma & Willem Wijting. 2007. *Land Use Planning and the Right to Compensation in the Netherlands*. Washington University Global Student Law Review, Vol.6, p1, 9.

⁸⁸ *Id.*

⁸⁹ Land Planning Act (2003), art. 36(1) (Poland).

⁹⁰ *Id.*, article 36(3).

⁹¹ Katri Nuuja & Kauko Viitanen. 2007. *Finnish Legislation on Land Use Restrictions and Compensation*. Washington University Global Student Law Review, Vol.6, p49, 50. Available in http://law.wustl.edu/wugslr/issues/volume6_1/p49NuujaViitanen.pdf.

⁹² Land Use and Building Act, § 101 (Finland).

⁹³ Nature Conservation Act (1996), § 55 (Finland).

⁹⁴ According to the Parliament Constitutional Law Committee, if the restrictions do not affect the normal, reasonable, and sensible use of the property, and are generally and non-discriminatorily applied, then the restrictions do not infringe on property ownership and are not compensable. See Katri Nuuja & Kauko Viitanen, fn 92, at 50.

⁹⁵ In addition, scholars have raised another argument to support farmers' claim for compensation. According to China's Administrative Law, the forestland contract between farmers and village collectives should be considered an "administrative contract" and the implementation of the NFPP constitutes a unilateral interference with this contract that substantially restricts farmers' contractual rights to forestland. Thus farmers are entitled to compensation under the Administrative Law. See Li Minyang, et al, *Discussion on Payment for Ecological Services Policies and Laws for Public Interest Forests*, Nanjing Forestry University Journal, vol 3(2), 57-60, June 2003. This argument has its drawbacks because farmers' land use rights obtained from the "contracts" with village collectives are property rights under the law, which are stronger rights and deserve a higher level of protection than general contractual rights.

⁹⁶ Liang Huixing. 2003. *Methods of Judging*. Law Press (China), p96. See also general provisions on land expropriation and requisition of the 1998 Land Management Law, chapter 5.

⁹⁷ See Long Xingang. 2007. *Definition of Land Requisition for Public Purposes*. Administrative Law Studies, Vol. 2007(2), p53-58; Chen Bo. 2007. *Introduction to Regulatory Takings Theory*. Science & Technology Information, Vol. 32, p128-129.

⁹⁸ Guangdong Provincial Government. 2001. *Management Method on Payment for Environmental Services Fund for Public-Interest Forests*. November. Available at <http://www.gdf.gov.cn/index.php?controller=front&action=view&id=9468>.

⁹⁹ *Id.* article 4.

¹⁰⁰ Guangdong Forestry Bureau. 2010. *Major Changes for Guangdong's Payment for Environmental Services Mechanism for Ecological Public-interest Forests*. October. Available at <http://www.gdf.gov.cn/index.php?controller=front&action=view&id=10011681>.

¹⁰¹ Zhejiang Provincial Bureau of Finance. 2005. *Management Methods on Payment for Environmental Services of Public-interest Forests*. January.

- ¹⁰² Ningbo Municipal Bureau of Forestry. 2008. *Management Method on Payment for Environmental Services of Forests*. September. Available at <http://www.cnlyue.com/html/main/nbsView/263113.html>.
- ¹⁰³ Fujian Provincial Forestry Bureau. 2007. *Notice on the Implementation of Lower River Regions*. Forestry Ecological Benefits Compensation to Upper River Regions. April 20. Available at <http://www.fjforestry.gov.cn/InfoShow.aspx?InfoID=12599&InfoTypeID=5>.
- ¹⁰⁴ There are multiple research reports on the beneficial effects of the existing programs. One good example is that the official report from Guangdong in 2011 illustrates some of the positive progress, see http://www.chinaacc.com/new/184_900_201108/30lu2237871585.shtml.
- ¹⁰⁵ United States Department of Justice. Available at <http://www.usdoj.gov/enrd/land-ack/Legal.html>.
- ¹⁰⁶ Christopher Serkin. 2005. *The Meaning of Value: Assessing Just Compensation for Regulatory Takings*. 99 Northwestern University Law Review 677, 687-703.
- ¹⁰⁷ Expropriation Act, § 30-33, 35, 37 (Finland).
- ¹⁰⁸ The Constitution of the Republic of Poland, art. 21(2).
- ¹⁰⁹ The Land Planning Act (2003), article 36(1) (Poland).
- ¹¹⁰ Microslw Gdesz. 2006. *Compensation for Depreciation of the Property Value According to Polish Land Use Law*. Washington University Global Student Law Review, Vol. 5, p559, 569.
- ¹¹¹ Poland's 2001 Environmental Protection Law contains similar compensation provisions (articles 32-33).
- ¹¹² Land Management Law, article 47.
- ¹¹³ State Council. 2004. *Decision on Deepening Reform and Restricting Land Management Practices*. October. Also known as the "Central No. 28 Document"; see also Property Law, article 42.
- ¹¹⁴ Yao Shunbo. 2004. *Requisition of Non-publicly-owned Forests and Compensation*. Problems of Forestry Economics. Vol. 24(2), p81-84. April; Huang Dong. 2009. *Discussion of Regulatory Takings and Compensation for Ecological Public-interest Forests*. Forestry Economics, Vol. 6, p21-25.
- ¹¹⁵ Allocation of forestland to individual households is generally desirable, but community forest management is still a viable tool, especially for ethnic-minority people in southwestern China who have a strong tradition of sharing, maintaining and developing community resources such as forests.
- ¹¹⁶ There is a large amount of international literature supporting the notion that secure land rights tend to lead to mid- to long-term investments in land. In the case of China, it is found that when farmers were given official documentation of their land rights, they were 268 percent more likely to make mid- to long-term investments in their land than those without any land rights document. See Roy Prosterman, etc., *Secure Land Rights as a Foundation for Broad-based Rural Development in China*, National Bureau of Asian Research, Nov. 2009.
- ¹¹⁷ SFA. 2010. *2009 Annual Report on Forestry Development of China*. Available at <http://www.forestry.gov.cn/portal/main/s/62/content-437412.html>. August. See also Stein Holden, Xu Jintao, & Jiang Xuemei. 2009. *Tenure Security and Forest Tenure Reform in China*. Available at <http://arken.umb.no/~steiho/HoldenXuJiangForestTenureReformChinaNDEC2009.pdf>.
- ¹¹⁸ Depending on local rules, picking small amounts of mushroom, herb medicines and other products from forests are allowed in some, but not all of the NFPP areas.
- ¹¹⁹ For an excellent discussion on this approach, see FONAFIFO, CONAFOR and Ministry of Environment, *Lessons Learned for REDD+ from PES and Conservation Incentive Programs. Examples from Costa Rica, Mexico, and Ecuador* (2012).
- ¹²⁰ One effective approach is to create a direct deposit system where the payments go directly to the accounts of the recipients. The agricultural subsidies paid by Chinese government to farmers are using a direct deposit system and has proven quite effective in reducing illegal interception of the funds by local officials.
- ¹²¹ See news reports on the controversial draft of the amended Land Management Law at <http://news.sohu.com/20100524/n272294759.shtml> and finance.qq.com/a/20090425/000034.htm.
- ¹²² National Statistics Bureau, 2009 Annual Statistics Report on National Economy and Social Development, available at www.stats.gov.cn/tjgb/ndtjgb/qgndtjgb/t20100225_402622945.htm.
- ¹²³ Wang Yu, fn 62, at 196. The figure of 35 million hectares of collectively owned forestland is used here to calculate the total potential compensation.