

Payments for Ecosystem Services in Japan: the Private Sector's Approach in the Rural Areas

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Abstract

In this article, the current status of Payments for Ecosystem Services (PES) in rural areas by Japanese private companies is clarified and their characteristics are discussed. A comparative analysis of three cases was undertaken, including two Japanese cases: (1) the buyer, a beverage company, pays indirectly to the sellers farmers/foresters through public institutions, and (2) the buyer, a semiconductor manufacturing company, pays to the sellers based upon direct negotiation; the third case (3), is a textbook example by French company Nestlé Waters. As a result of the analysis, some interesting characteristics were identified. Firstly, the paid-for conservation act is specified and quantitative evaluation is conducted in the direct negotiation scenarios (2) and (3), whereas in the indirect payment case (1), the sellers were allowed to decide the details of the conservation activities and quantitative evaluation was not conducted with the same level of rigour. On the other hand, the standard of setting the rate of payment was different between the cases depending on the social background of the communities in which the PES is enforced. It was also found that all cases shared a common element, in that intermediaries play essential roles to facilitate communication between the companies and the farmers/foresters.

Keywords: Payments for Ecosystem Services; Private Sector's Approach; Ecosystem Services in Rural Areas

Abbreviations:

PES	:	Payments for Ecosystem Services
CBD-	:	Convention on Biological Diversity
COP	:	Conference of Parties
TEEB	:	The Economics of Ecosystem Services and Biodiversity
WBCSD	:	World Business Council for Sustainable Development
IUCN	:	International Union for Conservation of Nature
ICDPs	:	Integrated Conservation and Development Projects
SFM	:	Sustainable Forest Management

1. Introduction

Payments for Ecosystem Services (PES) are one environmental economic approach to conserve the natural environment that has been attracting attention. The core idea of PES is that the beneficiaries of ecosystem services give incentives for the conservation of these services to landowners or local actors who can provide them, by compensating them for the costs of environmental conservation and management.

Introducing PES as a political measure has been called for at the international level. At the Convention on Biological Diversity Conference of Parties 9 (CBD-COP9), a resolution was passed to seek out new and innovative financial mechanisms including PES (Decision IX/11). In the report "The Economics of Ecosystem Services and Biodiversity (TEEB)" which was announced at CBD-COP10, a political proposal was made to decision makers on the implementation of PES schemes.

In recent years, the application of PES schemes has also been considered in Japan. The importance of diffusing and implementing PES schemes are specified in the 'National Biodiversity Strategy of Japan 2012-2020' which was developed in 2012.

In this paper, we focus on the application of PES in rural areas in Japan where it can possibly be an effective tool for ecosystem service conservation. Ecosystem services in rural areas are various, and cover a wide range at the local, regional, and public levels. Using agricultural land as an example, at the local level, the major benefit is gained from the usage value for agricultural production, recreation and so on, whereas at the regional and global level most of the benefit is gained from non-use value such as biodiversity, landscape and others. However, in most cases, the expense of ecosystem services management is borne by local people while beneficiaries of those services in urban areas don't pay for them. Ecosystem services in rural areas in Japan have been maintained to the current extent due to local people who invest labor in managing the agricultural land and

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forestry to maximize the profits gained from agricultural and forestry products. Since these investments are always made with an expectation of earning income from those products, if the investment does not pay off, the local people lose incentive for resource management and cease their production activities. As a result of the reduction in human interactions, both the biodiversity and ecosystem services have deteriorated. Abandonment and underuse of farmlands and artificial forests has become one of the threats to biodiversity and ecosystem services in rural areas in Japan [1][2].

The cost of conservation of ecosystem services in rural areas has been dependent in no small part on the national treasury for income. In fact, many municipalities in rural areas are dependent on the national treasury for all aspects of finance. Various subsidies for agriculture and forestry such as the Direct Payment System for Hilly and Mountainous Areas and Measures to Conserve and Improve Land, Water, and Environment as well as public projects regarding rural environmental improvement have contributed to the management of ecosystem services. However, due to the continuous decline in population and aging demographics, tax income has stagnated and tax allocation to local governments has been on the decrease, along with an increasing demand for revenue efficiency. In addition, the Proper Burden Principle tends to be emphasized under the process of reform of local finance systems. Under such a situation, it is necessary to diversify and enhance the mechanisms of funding to conserve ecosystem services in rural areas. It is considered that there is a possibility that the idea of PES can achieve the income transfer from the beneficiaries of ecosystem services in urban areas to the providers of those services in rural areas (those who are engaged in agriculture and forestry). If we could make good use of the PES idea, a mechanism could be established in which external beneficiaries who enjoy ecosystem services from rural areas pay appropriate compensation and by using this payment, local people receive a fair reward for their management of farmland and forests.

In this paper the authors focus on the voluntary approaches of the private sector, especially businesses, as a means of promoting PES for conserving ecosystem services in rural areas in the future. Most private companies use ecosystem services both directly and indirectly, and there are many industries that cannot exist without a stable supply of ecosystem services. Considering that the financial situation of the public sector, including the central and the local governments (who have so far played a role in investing in conservation) is deteriorating, it is important to discuss mechanisms or institutions to make the private sector take on the burden or appropriate costs of conservation of ecosystem services they use, based on the Beneficiary Pays Principle. According to the report of World Business Council for Sustainable Development (WBCSD) and the International Union for Conservation of Nature (IUCN), there have been some successful cases of PES schemes led by private companies. It has been mentioned

that PES can be an effective method in order to get the private sector involved in ecosystem services conservation [3].

However, most of the time, PES is introduced as examples of agriculture and forestry promotion measures by the public sector, and there has been little discussion on the private sector's approach to PES. In this paper the main objective is to reveal the characteristics of PES schemes entered into by businesses in Japan through investigating two cases and comparing them with one of the most typical cases of a PES scheme by private sector from overseas.

This article consists of two parts. Firstly, we'll try to set a clear definition of the term PES in this article as a new idea of conservation. Wunder [4] mentioned that the literature so far has not formally defined PES, which has confused the discussion in this area. In response, they set five criteria to describe the PES principle (detailed later) [4]. However there has been some controversy and the definition of PES has yet to be agreed on, despite attracting widespread interest as an innovative tool for financing conservation. Therefore it is necessary to define what PES means in this article before taking up the main subject. The summary of the results of the case study investigations are then described and their characteristics discussed.

2. Definition of PES

2.1. Ambiguity of the term PES

As has been mentioned already, while the idea of PES has been rapidly gaining global attention, its definition has not yet been established [4][5]. As a result, the term PES has been used with various meanings with the tendency that the definition is becoming ambiguous, as has been observed in many cases regardless of business practice or research level. In recent years, there has been a tendency for the term to be used as a generic term for market-based biodiversity conservation mechanisms.

Therefore, the detail of how the idea of PES originated will be briefly described in section 2.2 by referring to previous works. The definition of PES as applied in this article will then be stated, clarifying the basis for extracting learnings from the cases analyzed in section 2.3.

2.2. The origin of PES

Protection of the natural environment from the latter half of 19th century was mostly dependent on setting aside protected areas such as national parks and regulating land use in those areas. However, these approaches were revealed to be not always effective, especially in developing countries. The local residents sometimes took on uncooperative attitudes to the strict regulations brought about from outside. And there were some cases in which the indigenous people were 'driven out' from the legally constituted territories, which negatively impacted on them both culturally and socioeconomically [6]. The lack of

appropriate governance systems in the area also prevented this method of nature protection from being ultimately effective [7].

In this situation, participatory conservation such as Integrated Conservation and Development Projects (ICDPs) and Sustainable Forest Management (SFM) have emerged as supplementary approaches to direct regulation of protected areas [8][9]. ICDP is an approach that aspires to combine social development with conservation, aiming to achieve both better living and welfare of local residents and conservation of natural resources at the same time [10]. ICDPs promoted the local communities' participation in the process of implementing the conservation projects and tried to deal with their social and economic requirements, benefitting them by transferring money from eco-tourism, stimulating environmental friendly agricultural production and so on. However, such indirect means as tourism and creating a market for agricultural products did not produce much economic benefit for the local population and didn't work for effective conservation [11]. This situation generated interest in the more direct methods already implemented in some developed countries in Europe and the U.S. [9]. The basic idea of this method is to enable one who desires conservation of nature to buy the conservation activities directly from the one who undertakes the conduct of the activities at a negotiated price. The conservation schemes based on this idea have been spreading gradually in developing countries especially since the Rio summit in 1992. They achieved an effect especially in areas that couldn't be covered by setting protected areas or direct regulation only [9]. This approach of buying conservation activities directly has been given various names such as 'performance payments' [12], 'Conservation Concessions' [12], 'Compensation and Rewards for Environmental Services' [9], 'Compensation for Environmental Services' [13], and others. In recent years in most literature or reports it is referred as 'payment(s) for environmental service(s)' or 'payment(s) for ecosystem service(s)', the origin of PES.

2.3. Definition of PES

PES was conceptualized as a conservation approach based upon direct transaction between the users of ecosystem services and the providers who are the owners, users or managers of the land where the ecosystem services are provided [14]. Based on this concept Wunder presented five criteria of PES [4]:

- I. a voluntary transaction where
- II. a well-defined ecosystem service (or a land-use likely to secure that service)
- III. is being 'bought' by a (minimum one) buyer
- IV. from a (minimum one) ecosystem services provider
- V. if and only if the ecosystem services provider secures ecosystem services provision (conditionality).

Wunder stated that when a scheme meets all the 5 requirements, the case is a 'genuine PES'; but if only a few and not all 5 requirements are met this is called a 'PES-like

scheme' [15]. These criteria have been adopted in much of the literature and are considered to be the mainstream concept of PES.

On the other hand, there exist several criticisms against this definition. Some researchers point out that since most of ecosystem services are public goods which require a high transaction cost, the voluntary transaction between buyer and seller cannot be realized and the role of government might be significant in reality [16][17][18]. Wunder himself observes that the case which fulfils all the five requirements rarely exists [4]. He said the hardest criterion to meet is No. 5 regarding conditionality, describing that many PES initiatives are loosely monitored and payments are made in good faith rather than being truly contingent on monitored service provision.

Considering the difficulty of fulfilling all requirements, in the following part of this article PES is used as a term which means a conservation scheme which meets at least the first four criteria.

3. Private Sector's Approach to PES

3.1. Research subjects

3.1.1. Two different PES types

From the comprehensive survey of literatures including CSR reports of Japanese companies, it was revealed that there are scarce examples of PES in rural areas in Japan.

PES schemes implemented by the private sector may be grouped into two types according to the degree of directness of transaction between the two parties, buyer and seller. One type is that buyer companies and sellers, in most cases farmers or foresters, are indirectly connected through public institutions such as municipalities, in which companies pay for ecosystem service provision indirectly through the public institutions. Most cases fall into this category so this can be regarded as typical for PES by private companies in Japan. The other type is characterized by direct negotiation between companies and farmers/foresters. The relation between the companies and the farmers/foresters is closer than the former and the companies pay directly to farmers or foresters. Only a few available cases can be classified into this category, and such cases are quite rare in Japan. Due to the limitations of space in this article, one representative example from each category is chosen and a more detailed analysis is undertaken. As for the former type of PES scheme, a case of a water source forest conservation project by a beverage company (in the following, referred to as company A) will be described. For the latter type of PES scheme, a ground water conservation project by a semiconductor manufacturing company (referred to as company B) is presented. In addition to the cases from Japanese companies, a water-quality protection project by French company Nestlé Water (referred to as Nestlé) is examined for comparison.

3.1.2. Methodology

In this article comparative analysis is described to clarify the characteristics of the cases. For company A, the data was collected from open information on its website and by an interview with the person in charge of the conservation program. For company B, the data was collected mainly from open information in the websites of company B and an environmental NPO, the intermediary of the PES program later mentioned. Interviews were also conducted with a number of stakeholders, including the person in charge of the NPO and a person in charge of a Land Improvement District who were also intermediaries of the program. As for the case of Nestlé, detailed information which is sufficient for analysis was acquired from the paper of Perrot-Maitre and others [19].

3.1.3. Motivation for Conservation of Water Resources

Company A consumes around 10 million cubic meters of tap water per year (in 2012) in the process of beverage production. Needless to say, securing stable supply of water as a raw material is absolutely essential for the sustainability of their production activities. Nevertheless, the secondary forests which account for a larger part of the forests in Japan are in general deteriorated due to underuse, which may cause a decline of forest hydrology. In response to this, the company started a forest conservation program in which it pays to those who manage the water conservation forests which are the source of water-supply for their factories, for example, local forestry cooperatives. Considering that in this program, company A pays to forest workers and managers through governmental schemes which are established to promote private companies' participation in forest conservation, this program can be regarded as indirect PES.

Company B began operations at its plant in a local area that is known to have rich groundwater, because of the necessity of acquiring large quantities of clean groundwater in the cleaning processes of the semiconductor plant. It uses around 2 million cubic meters of water per year (in 2012), including the groundwater and purchased industrial water. The groundwater source is located in the middle basin area of a neighbouring river. A research group made clear that the middle basin area has high water recharging capacity of 640 million square meters per year, which is 5 times or more than other areas. And the fact has also come out that the paddy fields in that area account for one-third of the recharging capacity, because the soil so easily lets water through. This means that the rich groundwater has (to some extent) been supplied by farmers who flood their agricultural fields. In recent years, however, it has come out that the groundwater level has lowered gradually because of reduced rice production and increasing urbanization [21]. Reducing the risk of groundwater depletion was the important issue for company B because the groundwater is an essential resource for semiconductor production. So

company B started the groundwater conservation program where it pays a fee to cover the management and preparation costs of volunteering local farmers who flood their fields with water drawn in from the neighbouring river when they aren't using the fields for agricultural production. Because in this PES program company B pays to farmers directly through a local Land Improvement District, it can be regarded as a type of direct negotiation.

Nestlé uses around 1.38 billion cubic meters of water per year (in 2012)[22]. Vittel mineral water which is one of the main products of Nestlé, originates in 'Grande Source' (means 'Great Spring'), located in the town of Vittel at the foot of the Vosges Mountains in north-eastern France. The water of Grande Source, which comes from a 6,000 hectare aquifer 80 metres below ground level and is lifted naturally to the surface through a natural geological fault, has been well known since Gallo-Roman times and is reputed to cure kidney ailments. In the middle of the 1800s the spring was purchased by Boulopumié family and a spa developed in the town of Vittel, following which the reputation of the spring spread rapidly and people visited from all over Europe to drink its waters. The idea of bottling and marketing it developed in 1882 and the Société Générale des Eaux Minérales de Vittel (SGEMV) and the Vittel brand were created. By 1898 one million bottles had been sold. A century later one billion bottles are sold every year in 70 countries. In 1969, the Nestlé group purchased 30% of the de la Motte family stock (then owners of the Vittel Brand), and in 1992 the spa and bottling plant was sold to Nestlé Inc. Then in 2002 the bottled water division subsequently became Nestlé Waters. Vittel is one of the ten top selling brands out of 75 brands marketed worldwide by Nestlé. Although Vittel water is labelled 'natural mineral water' with the most constraining legislation and high reputational risk and is characterised by a particularly low level of nitrates, the nitrate pollution risk was forecast to increase by the research agency Agriculture-Environment-Vittel (AGREV) (which was established by Nestlé in partnership with a French research institute), because of the expansion of agriculture in the water catchment area. French legislation dictates that, if mineral concentration changes, the right to use the 'natural mineral water' label is lost. Preventing pollution and conserving water quality became a critically important issue for protecting the Vittel brand. Therefore in 1993 Nestlé started a conservation program by providing farmers in the water catchment area with economic incentives to voluntarily change their agricultural practices into more environment-friendly ways. In this program Nestlé pays farmers directly through an agricultural extension agency established by Nestlé itself, so we can regard this PES program as a type of direct negotiation.

3.2. Indicators of comparison

Five indicators are used for comparing the three cases. The first one is 'targeted ecosystem services and conservation activities'. 'Targeted ecosystem service' means the ecosystem services that the PES program is attempting to conserve and 'targeted conservation activities' means the activities paid for in the PES program. The second indicator is 'buyer and seller'. Here buyer refers to those who benefit from ecosystem services and bear expenses for conservation of those services, whereas seller refers to those who conserve and manage the ecosystem that provides the targeted ecosystem services and get compensation for their conservation activities. The third one is the 'intermediary', who mediates negotiation between buyer and seller. The fourth indicator is 'payment', which includes factors such as payment amount and form of payment. The fifth indicator is 'monitoring and evaluation', which is about whether the PES program has a monitoring or evaluation system or not. These indicators are largely extracted from the main components of PES programs described by Wunder et al. [20] though some modification were made to suit the purpose of this article.

3.3. Results of analysis

The results of analysis are shown in Table 1. Here we summarize the results.

3.3.1. Targeted ecosystem services and conservation activities

In all three cases investigated in this article, a water service is targeted for conservation. First, in the case of company A, since the company continuously uses very large amount of water for their beverage production, it pays for the management of the water conservation forests which are the source of water supply for all of their 9 factories and 6 offices around the country. The conservation activities paid for are forest management, including thinning, forestry road management, weed clearing, planting and raising trees, and so on. The details of forest management works are decided according to the forest management plan established by the sellers, who are the foresters at the site, land owners and land managers. The buyer company allows the sellers to determine how the plan is carried out according to the

Table 1 Characteristics of private PES programs investigated

Indicators of Comparison	Company A	Company B	Nestlé
Ecosystem services and conservation acts	Water conservation forest management aiming to conserve tap water	Inundation of paddy fields aiming to conserve ground water	Conversion of farming methods aiming to conserve water quality
Buyers and sellers	Payments to forest owners' cooperatives	Payments to farmers from company B	Payments to farmers from Nestlé

Intermediaries	Local governments and public organizations of the country	Local environmental NPO, a Land Improvement District	Agricultural extension agency that is trusted by farmers
Payments	N/A Sending a few thousands weekend-volunteers per year	11,000 yen per 30 days, 16,500 yen per 60 days and 22,000 yen per 90 days (per 10a)	200 Euro for income compensation /ha + 15000 Euro for facility investments
Evaluation and monitoring	No quantitative evaluation and monitoring system	Periodic evaluation and monitoring of recharging volume	Periodic evaluation and monitoring of pollution concentration

forest condition instead of planning or directing specific management works. In the second case, company B's PES program targets conservation of groundwater used for semiconductor production. The main controllable groundwater infiltration sources are the paddy fields located in the middle basin area of a neighbouring river. Company B has concluded an agreement in which local farmers flood their agricultural fields in between crop cultivation periods, and in return, provides financial support for them. In the third case, the targeted ecosystem service in Nestlé's PES is water quality used for producing Vittel mineral water. In order to maintain aquifer water quality to its high standard, Nestlé pays farmer to compensate the cost of reconverting to low impact dairy farming, including composting animal wastes, abandoning agrochemicals and so on, and to guarantee their income.

3.3.2. Buyer and seller

In all cases, buyers of the targeted ecosystem services are the companies who consume ecosystem services for their production activities. As for the seller, in the case of company A, it implements the PES program in 15 forest sites, which are the factories' or offices' water conservation forests. The total area of conserved forest is about 1,000 hectares. Those who conduct conservation activities are forestry cooperatives, regional forest management offices, environmental Non-profit Organizations (NPO) or others engaged in management of the water conservation forests. As for company B, sellers are the volunteer local farmers in two rural communities in the water catchment area who conduct water flooding in their agricultural land in the off season between crop cultivation periods. Most of the farmers in the area have already participated in the program so far. In the case of Nestlé, sellers are the farmers who agree to change their farming practice and technology to the targeted conservation activities mentioned previously. All 26 farms in the catchment had adopted the new farming methods by 2004.

3.3.3. Intermediary

In company A's approach, public institutions play an important role as intermediaries. For example, when a water source forest belongs to a national forest, the Forestry Agency or National Land Afforestation Promotion Organization select outsourced forestry workers and introduce them to the buyer company. As for the prefectural and municipal forest, the local governments mediate between the company and the forestry worker. It is worthy to note that when the company conducts the program, it uses the governmental schemes to promote companies' participation in forest management, such as 'Hojin-no-Mori' by Forestry Agency and 'Kigyo-no-Mori' (both mean 'company' forest') by prefectural governments.

In the case of the company B, a local environmental NPO and a Land Improvement District played a role as intermediaries. When the company began operations at its plant, the NPO sent an open letter concerning water consumption and pollution control in the plant and the company answered to it in an earnest manner. This led to a good relationship between the organisations. Later a suggestion was brought forth by the NPO to fully return the groundwater the company used. The suggestion was accepted and the company started the program. For this reason it can be said that the NPO triggered the PES program. The Land Improvement District, which is an agricultural water user organization, also played an essential role to find the farmers who voluntarily cooperate with the program.

As for Nestlé's program, the negotiation with farmers was implemented under the leadership of Agrivair, an agricultural extension agency created by Nestlé in 1992. Although Agrivair is buyer-created and so is not a pure third-party organization, it has a solid local base and has been trusted by the farmers because the appointed director was formerly employed with a research team that worked on AGREV and is well-known among farmers and other stakeholders in the area. Furthermore, Agrivair was strategically located close to farmers and farmers' associations so that it could contribute to ensure the participation of farmers in the design and implementation of the program and facilitate the communication of scientific information with them as well.

3.3.4. Payment

At company A, definite data regarding the amount of payments could not be obtained; however, the amount that was paid by the public institution (intermediary) was presented by the institution. This includes actual expenses on water conservation forest management and daily wages. In addition, employees are sent to help in maintaining water conservation forest as volunteers on the weekends and a few thousand employees are sent every year.

At company B, farmers are paid a cooperation fee based on number of days and the area for filling water and the amounts are 11,000 yen per 30 days, 16,500 yen per 60 days

and 22,000 yen per 90 days (all these values are per 10ha). These amounts were decided based on consultation with the Land Improvement District, the intermediary, and considering a series of expenses such as an actual expense and an administrative expense to fill water. They are decided as amounts to compensate part of those expenses.

At the Nestlé, the basic amount of the benefit for farmers was 200 Euro per 1 ha per year. This amount was decided as a result of negotiations with farmers that they can pay off their debts needed to purchase lands and also compensate their income during the contract period. Additionally, the company has compensated 15,000 Euro as a maximum amount to each farmer for expenses needed for things such as equipment for agricultural facilities accompanied with the change of farming method.

3.3.5. Monitoring and evaluation

At company A, as was already mentioned in 3.3.1, the details of management works of water conservation forests are decided by the sellers, who are the forest managers at each site. There is no scheme to monitor efforts by the managers or to quantitatively evaluate conservation effect. How much of the water resources are transacted in the PES program is not clear because the quantitative evaluation of the impacts and effectiveness of the forest management on water cultivation has not been implemented.

At company B, periodic evaluation of ground water recharge quantity is conducted. In the evaluation scheme, company B aims to fully return the water into the ground which its own factory used and it quantitatively evaluates the amount of groundwater recharged with help from the researchers at a neighbouring university. From 2003 to the 2011 fiscal year, the recharge volume successfully exceeded the volume used by the factories in all 6 years except the 2005 fiscal year, and in the 2012 fiscal year, the amount of water recharged was 2.19 million cubic meters which is the same amount as the water consumed in that year.

At Nestlé, the research organization INRA and the mediator organization Agrivair, periodically monitor pollution concentration and guide farmers continuously. By 2004, after 12 years of operation, the PES program had succeeded in incorporating 92 percent of basin's hectares and reducing nitrogen load of the Spring's source water [23].

4.1. The risk of ecosystem services loss influences designing of PES

There were common points observed between company B and Nestlé, which are characterized by direct negotiation and closer fit to the original form of PES.

The first point is that the conservation act of ecosystem services, which is the subject of payment, is specified. For company B, it is water filling by farmers and for Nestlé, change of agricultural methods to designated ones, both of which are limiting. On the other hand, for company A, detailed contents of the conservation act are left to the

consignee of water conservation forest management, hence the company does not designate acts in detail.

The second point is that the quantitative monitoring and evaluation regarding enforcement of the scheme conditions and outcomes are conducted periodically. In the scheme of company A, on the other hand, this is not enforced strictly. An important question is therefore, "How did these common points between the company B and Nestlé and the points of difference between those two companies and company A occur?"

By way of a reason for these, the background situation that both company B and Nestlé had in common is inferred to have an influence. As discussed in section 3.1.3, the fact that water services that are essential for their production activities have been exposed to the risk of shortages and pollution has been recognized, which is why company B and Nestlé started their schemes. That is, water services conservation was considered to be an urgent subject for both companies to continue their production activities. Therefore, it is presumed that the measures to reduce shortages and pollution were closely examined scientifically and they were indicated to farmers. It is presumed that both companies conducted quantitative monitoring and evaluation regarding scheme enforcement conditions and outcomes since obtaining the conservation effect was of absolute importance to them. In the case of company A, it was not under an urgent critical condition that their production activities were threatened. Considering that it doesn't have a scheme for quantitative evaluation of the program's effectiveness, it is assumed that not only water cultivation by forest conservation but some side objectives of the program, including improving employees' environmental awareness through volunteering activities and their interaction with local communities, are also considered important. Actually, thousands of the employees and their family members participate voluntarily in the program each year, helping forest conservation activities.

From these points, it can be considered that the state of ecosystem services utilized for companies' production activities being scientifically elucidated became an opportunity for more pure PES to be put into effect.

4.2. The standard of setting payment amount varies depending on the objectives of the scheme and social situations

On the other hand, the standard of setting the payment amount was observed to be a point of difference between company B and Nestlé.

At Nestlé, they have paid all the facility investment costs that can compensate farmers' income for participation in the PES, paying their debts and converting their farming methods to conservative ones, to prevent polluting actions by farmers completely. According to INRA's report, 11.3 million Euro has been paid for financial compensation to farmers and 3.81 million Euro to cover facility investment costs during the 7 years since the program started (INRA 1997). It can be said that they have thoroughly supported

farmers to convert their farming methods to environmentally conservative farming methods to avoid losing the Vittel brand, their key commodity.

On the other hand, at company B, the amount that compensates a part of a series of expenses for farmers' water filling has been paid. An interesting answer to the question of why only a part of expenses were covered and not the full amount, was obtained from the Land Improvement District, their intermediary. That is, if the amount of payment for water filling is set too high, there is a concern that the farmers' being able to get high income from the scheme may lead to them losing the motivation for their agricultural activities, which is their principle occupation. In the PES by company B, although ground water recharge is a direct objective, it should be enforced within an objective of local communities that farmers in the river-head area independently continue their agricultural activities; hence, it was meant to support farmers continuing their agricultural activities by supporting for the expenses required for water filling rather than compensating farmers' full income and make them dependent.

Thus, there are possibilities that the standard of setting payment amount varies depending on the objective of PES or the background of the society in which PES is enforced.

4.3. The intermediaries may have various roles

The intermediaries had an important role in the schemes of all three companies.

At company A, public organizations such as the local government select a location to conduct conservation activity and introduce the consignee for forest management, and by preparing various systems including "Kigyo-no-Mori", they provide an environment in which companies can comfortably work on their PES. Additionally, by public organizations' intervention, it can be presumed that understanding for the project can be more easily obtained as forest managers possess an awareness of, "Doing for public benefit". In the case of company B, a local environmental NPO made an opportunity for company B to start their PES. In addition, the Land Improvement District has undertaken setting up meetings with each farmer and information sessions to search for farmers who can cooperate on the project. It is considered that due to these actions, the negotiation expenses of company B were significantly reduced. In the case of Nestlé, Agrivair has undertaken setting up information sessions regarding the project for the farmers and also supporting farmers after the project has been enforced.

In this way, various actors can be intermediaries in PES. Moreover, intermediaries are considered to have a significant role as they facilitate communication between companies and farmers.

5. Conclusion

The decline of agriculture and forestry has had negative impacts on sustainable use of the ecosystem services in rural areas. To arrest the loss of biodiversity and ecosystem services in the areas, continuous use and maintenance of forest and agricultural lands in a sustainable manner is necessary. PES is one of the potential tools which contribute to this challenge by remunerating positive externalities of ecosystem service provided by farmers and foresters.

Considering the equitableness in the cost burden, businesses, who are often one of the largest users of ecosystem services, are especially expected to bear the conservation costs for the sustainable management of forest and agricultural lands. Furthermore, they can possibly reduce the production risk by investing in ecosystem service conservation because ecosystem service degradation can pose various production risks, for example unstable raw material security. Therefore, ecosystem conservation is necessary for businesses to sustain their own production activities into the future. In other words, businesses' engagement in PES can possibly contribute not only to ecosystem service sustainability but also business sustainability.

Nevertheless, as the CBD-COP8 pointed out, the private sector is arguably the least engaged of all stakeholders in the implementation of the Convention (Decision VIII/17), and expanding private sector investment towards ecosystem conservation cannot be accomplished overnight. Some support systems are needed to promote their engagement.

What is important to promote PES by companies towards ecosystem service conservation in farming and mountain villages? First of all, it is considered important to make companies have a sense of benefitting-by the scheme and a sense of impending crisis, by making them aware of the condition of ecosystem services they utilize for the production activities. Scientifically elucidating the condition of ecosystem services in farming and mountain villages and the development of a database regarding it is fundamentally important. Next, it is important to examine a proper state of payment with a consideration of the social situation surrounding ecosystem services. The ecosystem services of Japanese farming and mountain villages should be supplied by continuous agricultural and forest management activities. In addition, since the PES with companies bearing all costs, like Nestlé, is considered to have low versatility, the level of PES payment which contributes to the independence of agriculture and forestry needs to be determined. It is expected that there must be sufficient opportunity to discuss the state of payment among stakeholders, including buyer companies, farmers, foresters, local people and so on. Finally, it is critical to strengthen intermediaries' roles to promote companies' introduction of PES and to facilitate its enforcement. It is necessary for public organizations, NPO's and research organizations to establish some system or institution in which companies can easily participate in PES.

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