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Problems and Challenges: A Private Forest Purchase Method for National Forest Expansion in South Korea

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Abstract: This study analyzes the appraisal procedure for government purchasing of privately-owned forests in Korea, in terms of current status, existing procedures, and appraisal cases. The method is a widely conducted instrument of national forest expansion policy. For the purchase status, the purchase targets of private forests, unit price, and purchase records are analyzed. The purchase procedure is to analyze the process from the sale agreement submission of the owner to the transfer of ownership after completion of sales. The appraisal cases analyze the appraisal results according to the actual purchase of private forests. Three of the procedure's most problematic aspects are identified: The selection of appraisal companies, the failure to include the value of standing trees, and ambiguities in appraisal criteria. The study suggests some ways of improving the continuing implementation of the national forest expansion program through ongoing purchases of privately-owned forests. Firstly, the selection process for appraisal companies needs to be improved by independent third-party institutions or a competitive bidding system. Secondly, since forests are classified into standing trees and forest land, these two categories need to be appraised separately rather than together, as is often currently the case. Thirdly, since appraisal factors are currently based primarily on appraisers' subjective experience and knowledge, there is a need both for developing more objective appraisal criteria as well as for improving the training of appraisers themselves, to increase their level of expertise and ensure greater objectivity in forest appraisal.

Keywords: national forest expansion; private forest purchase; standing tree value; appraisal; individual factors

1. Introduction

Since it began in 1992, Korea's national forest expansion policy has been implemented by a variety of strategies, from loan purchases of private standing trees, or as enterprises under government management and profit-sharing, to currently ongoing purchases of privately-owned forests [1].

The Korea Forest Service (KFS) aims to increase the national forest rate to 32% by 2030, similar to that of developed countries such as Germany, through continuous expansion and consolidation of

national forests to strengthen the efficiency of forest management [2]. The KFS also plans to develop a foundation for forest ecosystem conservation, forest disaster prevention, and the systematic provision of forest welfare services. In this context, Lee et al. [3] and Jeong [4] have argued that the expansion of national forests is essential to realizing efficient and sustainable forest management. Shioya [5] and Yamaki [6] have also explained that continuous national forest expansion both maintains and promotes the public benefit and publicness of national forests.

However, in the case of Japan, about 30% of the total forest area is secured as national forests, and the management policy is to maintain and promote the public functions of forests through national forests [7]. The national forest area of Japan was rather decreasing due to forest development (2008: 7586 thousand ha; 2013: 7583 thousand ha; 2018: 7582 thousand ha) [8]. Meanwhile, in the case of China, which is a socialist country, ownership of a large amount of land owned by the state is changed to the private sector including farmers' cooperatives and foreign investors for efficient and sustainable forest management [9–12]. China's population growth has led to deforestation due to increased demand for timber, but the economic boom has prompted government investment in forest restoration and conservation, which in turn increased forests [13,14]. In a situation where the demand for forest certification by public and private forest owners around the world continues to increase, the United States, where more than half of the forests are privately owned, have a strong interest in forest certification and is implementing policies. Forests in Turkey and Bulgaria are mainly publicly owned (99% and 89%, respectively), these countries are also very interested in forest certification programs to enhance the public image of forest owners and other organizations and to inform consumers that forests are managed sustainably [15]. Brazil is working on the conservation and protection of forests through the Payment for Environment Services (PES) program, which assumes that the financial benefits of severe deforestation by cow breeding encourage environmental behavior [16].

In Europe, about 60% of forests are owned by millions of individuals. Furthermore, with restoration processes in Eastern European countries, community purchases in Western European countries (e.g., United Kingdom), and reforestation of farmland (e.g., Portugal), mean that the area of private forests is still increasing [17]. Except for Baltic countries, most of the old socialist countries still maintain a high level of state coercion on private forest management, but Western Europe has maintained a high level of owner rights since the mid-1990s [18]. Private forest area in 10 ECE (Eastern and Central Europe) countries (Bulgaria, Czech Republic, Estonia, Kosovo, Latvia, Macedonia, Montenegro, Romania, Serbia, and Slovakia) is very small, and most of the timber is self-consumption and the forest is managed directly by the private forest owner. Therefore, the local self-governance mechanisms were needed [19]. Sweden argued that the current forest policy and forest laws should be maintained and that different policies should be aimed at each forest according to the classification of forest ownership [20,21]. Lithuania, which has similar natural conditions to southern Sweden, has designated much more forest area as forest for timber production than forests responsible for the production function of non-timber forest products, and has legislated strict management restrictions on forests [22]. Many countries in Europe take the form of subsidy, education, and technical support for private forests to solve problems in private forest management, but the results are still not good. Furthermore, the government is aware of this but does not actively attempt to nationalize private forests [23–25]. On the other hand, Russia owns almost a quarter of the world's forests and has the largest land area among European countries. Besides, Russia is the only country among the world's top 10 logging countries without private forests, which is different from the mixed forest land ownership system, where private ownership is recognized. In particular, Siberia aims to harvest timber from forests, but there are many difficulties in forest management because the situation is very different from region to region due to climatic aspects and large area [26,27]. Forest nationalization is mainly done in southern and southeast Asian countries (India, Indonesia, Thailand, Nepal, and Bhutan) [28].

The KFS's strategies for expanding national forests include purchasing private forests, exchanges of national forests used by other ministries and public/private forests (management conversion), and approval for the use of unused forests by other ministries [4]. Among these, private

forest purchase for forest management is a widely used strategy. Targets for private forest purchases are categorized into forests for maintaining and promoting the economy, society, culture, and the environment, and forests for national forest management, or national policy [29].

National forests under KFS jurisdiction have increased from 1254 thousand ha in 1992 to 1471 thousand ha in 2015, a total increase of 217 thousand ha (17.4%). Additionally, out of the total national forest increase of 267 thousand ha up to 2015, private forest purchase, national forest exchange, national forest management conversion, and other acquisitions, respectively, account for 184 thousand ha, 144 thousand ha, 20 thousand ha, and 49 thousand ha. Private forest purchases comprised the largest portion, accounting for 68.8% [30,31]. However, the difference (50 ha) between the official increase in national forest size (267 thousand ha) and the actual increase in area (217 thousand ha) is because the existing national forest was reclassified as private forests through forest land-use conversion, management conversion, and sales.

When purchasing private forests, the KFS adopts the average appraisal value from two different appraisal companies. However, disagreements often arise between seller and buyer related to the skepticism of forest owners regarding the objectivity of an appraisal. These problems can be a major obstacle to maintaining the policy of continuous public forest expansion.

This study accordingly aims to provide guidelines for the continuous promotion of national forest expansion policy through the status analysis of private forest purchase status, purchase procedure, and appraisal cases.

2. Methods

This study analyzes the current status and procedure for private forest purchase and appraisal cases to identify the problems of private forest purchases, which is the primary implementation strategy of Korea's national forest expansion policy (Figure 1).

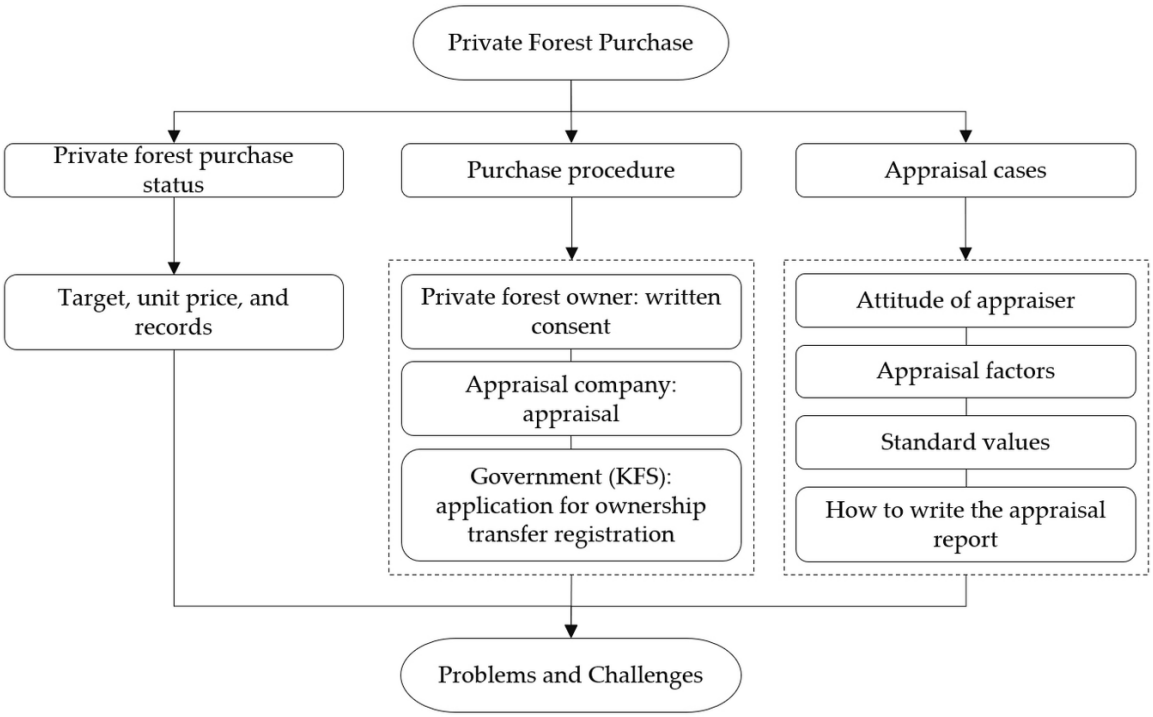

Figure 1. Flow diagram of this study.

First, the purchase status of private forests is analyzed by targets for purchase of private forests, unit price, and purchase records through the detailed implementation plan of the KFS main business from 2004 to 2016. In the private forest purchase records, the purchase area and purchase value of private forests by year from 1992 to 2015 were investigated to analyze the purchase trend of private forest in Korea over 20 years.

Second, in the procedure for the purchase of private forests, problems and improvement measures in the series of processes from the sale agreement submission of the owner and appraisal of the appraisal company to the transfer of ownership after completion of sales are analyzed.

Third, to analyze appraisal cases, we selected five cases that were carried out to the National Forestry Cooperative Federation (NFCF) by contracting out, including four cases (numbered 1–4) from 2015 and one case (numbered 5) from 2016. Each case includes two reports from the two different appraisal companies. In total, ten reports (which are internal data of the NFCF) are considered for the five appraisal cases. In particular, the case of private forest purchase has analyzed the attitudes of appraisers, appraisal factors for the forests, standard values, and how to write the appraisal report based on the appraisal reports. The attitudes of appraisers were investigated in consideration of relevant laws, the position of KFS, and practices of appraisal companies. For the forest appraisal factors, the official land prices of the comparative standard land parcels, time adjustment, regional factors, individual factors, and other factors were compared for each case. Finally, in how to write the appraisal report, the difference in the final appraisal amount for each case was compared and the cause was analyzed.

Meanwhile, the expansion of national forests in Korea is being implemented by the National Forest Administration and Management Act. The direction, target, purchase method, and purchase area of private forests are determined annually according to the detailed implementation plan of the Korea Forest Service's main business. Therefore, although it is an analysis of five cases, the purchase of private forests in Korea is carried out according to the above standards and procedures, so its representativeness will be sufficient. There was a limit to the collection of a large number of appraisal cases due to restrictions on information collection according to the Personal Information Protection Act of Korea and the internal regulations of the NFCF (prohibition of information leakage).

3. Results and Discussion

3.1. Private Forest Purchase Status

3.1.1. Purchase Target and the Unit Price

Private forest purchase has led to the consistent distribution of national forests in areas with low national forest ratios in Korea. Between 1992 and 2003, the KFS began purchasing private standing trees via loans and profit-sharing schemes. Between 2004 and 2007, forests for management and public interest improvement/preservation were purchase targets.

In 2007 in particular, purchases focused on protected forests where the exercise of property rights was restricted. From 2008 to 2013, targets were soil protection, landscape, and forests in need of ecological conservation. In 2014, the priorities shifted to healing forests. As a result of these changes, from 2015 to the present, arboretum buffers and forest road land were considered as purchasing targets.

Purchases between 2004 and 2005 were based on the goal commitment system aligned with the annual purchase value from the previous year. From 2006 to 2007, purchase value was determined regardless of the budget. Market prices have been applied since 2008. The goal commitment system is more focused on achieving the target amount rather than securing forest management land. Furthermore, since a seller may not be satisfied with a proposed sale price compared to the standard fixed price, it may be difficult to secure a target purchase. On this basis, the cause of the adjustment from the standard price to the appraisal price and the market price is a way to narrow the disagreement between the seller and buyer.

3.1.2. Private Forest Purchase Records

In private forest purchases, from 1992 to 2015 the area of land purchased for forest management was 184 thousand ha, with a purchase value of around KRW 109.6 billion. The KFS purchased approximately 5–6 thousand ha of private forest annually until 2003. From 2004 to 2007 the annual area purchased increased to around 12–13 thousand ha. Since 2011, however, the trend has been

decreasing, with only 8.3 thousand ha of private forest purchased in 2015. Overall, compared to before 2004, the purchased area of private forests has roughly doubled since 2004 [30,31] (Figure 2). This trend reflects the KFS's interest either in forest restoration and rehabilitation to improve the quality of lifestyle or in the private forest for land conservation and the creation of pleasant natural environments.

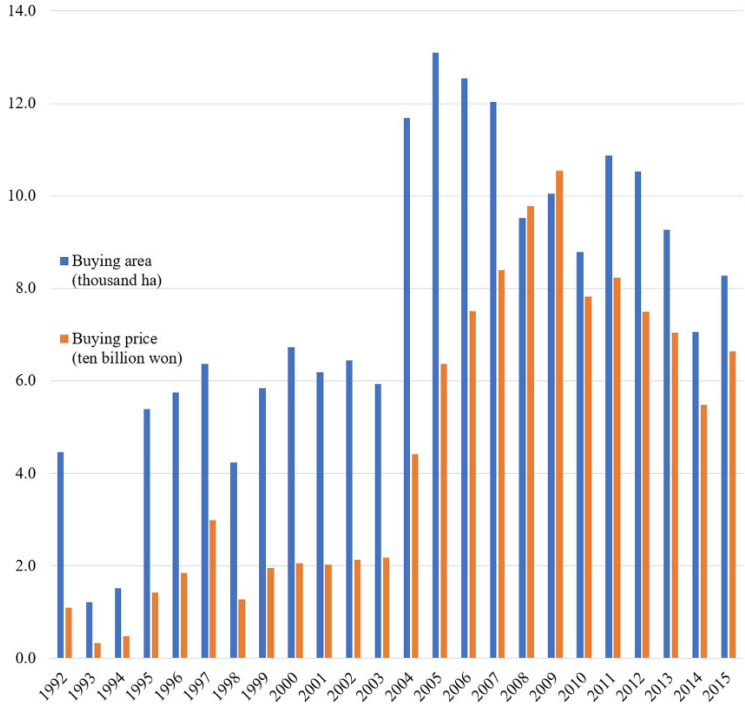

Figure 2. Private forest purchase records.

3.2. Private Forest Purchase Procedure

Private forest purchases begin with the forest owner submitting written consent to placing a forest under the jurisdiction of the KFS. Following this, the steps to complete the purchase are feasibility review, field investigation, review of the suitability of purchase target, appraisal, calculation of purchase value and consultation on the purchase, the conclusion of the sales contract, land transaction contract notice and real estate transaction contract report, application for ownership transfer registration, and payment. Additionally, the appraisal procedure consists of a field survey, a price formation factor analysis, the selection of appraisal methods, appraisal value determination, and appraisal report reply.

Concerning the selection of appraisal companies, two appraisal companies are selected based on recommendations from the KFS and the forest owner, respectively. However, the choice of appraisal company is a frequent source of disagreements about conflicts of interest, since both the KFS and the forest owner have a direct economic interest in the outcome of the sale. To increase public confidence, therefore, we recommend that the appraisal company should be selected either by a neutral institution or via a competitive bidding system. Issues such as whether appraisal companies should be selected by the parties involved, under-compensation for reducing costs, or overcompensation for conflict resolution have been extensively studied in the literature [32–35]. The studies in question have argued that in the interests of autonomy and credibility, recommendations for or selection of appraisal companies should be made by third parties.

3.3. Private Forest Purchase Case Analysis

3.3.1. Standing Tree Appraisal Criteria

Article 17 (1) of the "Appraisal Rule," the Korean government stipulates that when conducting forest appraisals, companies must differentiate between forest land and standing trees. However, the KFS usually excludes the standing tree survey from private forest purchases; its inclusion is required only when the value of standing trees has a significant bearing on decisions over the purchase price, or when an owner specifically requests it [36].

Even though the standing tree surveys were included in public forest purchases made by the KFS in 2011, surveys involving areas under 30 ha have been omitted since 2012. Even though a standard exists, the survey is rarely conducted during private forest purchases, which accounts for its absence from the appraisal record.

However, according to Article 14 (1) of the Enforcement Decree of the National Forest Administration and Management Act, the KFS is required to conduct a standing tree survey in the case of sales or exchange of semi-reserve national forests, so that the value of standing trees (including bamboo) can be included in the planned price. The Forest Service annually produces timber through tree cutting in national forests, which helps to further raise revenue. In 2015 profits from timber sales amounted to KRW 25.9 billion. The KFS recognizes the value of timber in its own right, even when this does not correspond to the value of a private forest as an expansion of the national forest system. While recognizing the value of standing trees on the one hand, on the other hand, the KFS paradoxically ignores the value of private forests as expansions of the national forest. This contradiction is from the outcome of having to secure large areas of national forest with only a small budget.

3.3.2. Standing Tree Appraisal Cases

After scrutinizing the criteria used by appraisal companies, we found that the value of standing trees is disregarded due to the lack of clear government guidelines for standing tree appraisal. Additionally, because of the low economic value of standing trees, the long history of forest trading practices, and government regulations, appraisal companies conflate the value of standing trees with that of forest land.

In this manner, appraisals that omit the value of standing trees may be an obstacle to national forest expansion policy due to forest owners' increasing distrust of the KFS itself. Therefore, it is imperative to insist that the government provide clear appraisal guidelines, that differentiate between forest land and standing trees to assess their respective values separately. It is equally necessary to establish criteria for accurately estimating the value of standing trees [37]. To this end, it is urgent to develop a database system to establish appraisal criteria for standing tree value in terms of timber value by species, as well as to calculate the value of standing trees for private forest purchase per ha in connection with the forestry system of agencies.

3.3.3. Forest Land Appraisal Criteria

Forest land-appraisal criteria reflect market values, among which the public Comparison approach of the official land value is applied. However, according to Article 12 of the Appraisal Rule, an appraisal amount is determined by comparing it to the current market value calculated using a sales comparison approach. This approach to official land prices involves both objective and subjective criteria. Objective criteria include the official land prices comparative standard land parcels, time adjustment, and regional factors. Subjective criteria include individual and other factors (Table 1).

Table 1. Forest land appraisal criteria.

Basis Value	**Comparison Approach for Official Land Prices (Market Value)**		
Appraisal factors	Objective criteria	Official prices for comparative standard land parcels	Official land value criteria for standard parcels in neighboring areas
		Time adjustment	Comparison of land price fluctuation rates and use in the same area
		Regional factors	Comparison of regional characteristics and land prices
	Subjective criteria	Individual factors	Access conditions, natural conditions, other conditions (forest stand conditions), and administrative conditions
		Other factors	Comparison with official land prices for comparative standard land parcels, time adjustment, regional factors, and individual factors

Among the subjective criteria, individual factors affect forest land prices through the unique features of every parcel of forest land. A comparison of individual factors refers to the processes which compare and reflect the gap between the individual characteristics of the purchase targets and the comparative standard land parcels [38].

Comparison between individual factors of forest land is divided into four categories: access conditions, natural conditions, other conditions (forest stand conditions), and administrative conditions. This study analyzed the comparative values of individual factors through five appraisal cases. As a result, it represents that discrepancy between appraisal companies concerning administrative conditions as the objective condition is the same or insignificant (difference of 0.05; case 2) since the comparative standard land parcels in question were selected either from surrounding or the same administrative area. However, access, natural, and other conditions (forest stand conditions), as the subjective conditions of appraisers of a forest road, or the gradient of forest land affect the value assessed by each appraisal company. In the case of access conditions, differences from 0.01 to 0.05 were shown in other cases except for cases 1–1, 2, and 5. In the case of natural conditions, differences from 0.01 to 0.03 were shown in other cases except for case 3. In the case of other conditions (forest stand conditions), a difference of 0.03 was found in case 2. In consequence, it shows that the subjective decision of the appraiser has a great influence on the calculation of appraisal price (differences from 0.08 to 0.043) (Table 2).

Table 2. Individual factors according to specific appraisal cases.

Case		**AC**	**Subjective Condition**			**Objective Condition**	**Individual Factor Value** ($w \times x \times y \times z$)
			AcCon (w)	**NaCon** (x)	**OthCon** (y)	**AdCon** (z)	
1 [a]	1–1	A	0.86	0.86	1.00	1.00	0.740
		B	0.86	0.87	1.00	1.00	0.748
	1–2	A	0.86	0.88	1.00	1.00	0.760
		B	0.89	0.87	1.00	1.00	0.744
	1–3	A	0.91	0.88	1.00	1.00	0.800
		B	0.90	0.90	1.00	1.00	0.810
2	2–1	C	1.00	0.78	1.02	1.00	0.796

		D	1.00	0.75	1.05	1.05	0.788
3	3–1	E	1.24	0.97	1.00	1.00	1.203
		F	1.20	0.97	1.00	1.00	1.160
4	4–1	G	1.40	1.15	1.00	1.00	1.610
		H	1.45	1.14	1.00	1.00	1.653
5	5–1	I	1.10	1.03	1.00	1.00	1.113
		J	1.10	1.05	1.00	1.00	1.155

Notes: AC = Appraisal company, AcCon = Access condition, NaCon = Natural condition, OthCon = Other condition (forest stand condition), AdCon = Administrative condition. [a] Case 1 is an appraisal that considered three regions as a case.

Most appraisal companies appraise individual factors as either "predominant" or "inferior," without specifying the criteria or basis for such assessments. Kim et al. [39] have argued critically that comparison values of individual factors differ depending on the appraisers. This is because individual factors are based on subjective judgments of how the target land parcel compares with other standard land parcels. Thus, they stress the need for a method that independently compares the value of individual factors by scientific analysis of GIS (Geographic Information System).

The Other Factors category refers to the final revised factors resulting from the comparison approach using official land prices. Under Article 14, paragraphs 3, 5 of the "Appraisal Rule," target land values are revised about Other Factors, including normal purchase or appraisal cases for areas adjacent to the target land parcel or similar areas within the same Entitlement Area. Although the purpose of this adjustment is to review the fairness and reliability of the appraisal, the selection of comparative target land parcels (purchase cases or appraisal cases) is based on appraisers' subjective judgment rather than independently defined criteria.

Since the selection of comparative standard land parcels is based on the subjective judgment of appraisers, different examples are selected by each appraisal company. The range of comparative target land parcels selected also varies widely, from only one to as many as nine (Table 3). In other words, the number of comparative target land parcels selected varies depending on appraisers' experience and expertise. This also leads to differences either in the revision value of comparative standard land parcels or in the prices for standard land parcel appraised by each company. This inconsistent selection in appraisals leads to frustration concerning transparency and fairness.

Table 3. Selection of comparative standard land parcels and comparative target land parcels in determining other factors by case.

Case (year)	AC	CoSLP/CoTLP	Unit Cost (KRW/m²)	Price Type	Base Period
1 (2015)	A	A-1	1661	Sales price	2014
		A-2	1883	Sales price	2014
		A-3	904	Sales price	2014
		A-4 [a]	45	Appraisal precedent (auction)	2014
		A-5	2	Appraisal precedent (auction)	2015
	B	B-1	1628	Sales price	2015
		B-2	1628	Sales price	2015
		B-3	1833	Sales price	2014
		B-4 [a]	1163	Sales price	2012
		B-5	1361	Sales price	2012
2 (2015)	C	C-1 [a]	656	Sales price	2012
		C-2	520	Sales price	2014

		C-3	570	Sales price	2014
		C-4	800	Appraisal precedent (auction)	2011
	D	D-1	315	Appraisal precedent (auction)	2008
		D-2	930	Appraisal precedent (auction)	2014
		D-3	520	Appraisal precedent (auction)	2014
		D-4 [a]	570	Appraisal precedent (auction)	2014
		D-5	380	Appraisal precedent (auction)	2012
		D-6	545	Appraisal precedent (auction)	2012
		D-7	605	Appraisal precedent (auction)	2012
		D-8 [a]	656	Sales price	2012
		D-9	535	Sales price	2012
3 (2015)	E	E-1 [a]	1034	Sales price	2015
		E-2	1411	Sales price	2015
		E-3	1500	Appraisal precedent (auction)	2010
	F	F-1	1243	Sales price	2010
		F-2	1411	Sales price	2015
		F-3 [a]	1034	Sales price	2015
		F-4	1500	Appraisal precedent (auction)	2010
4 (2015)	G	G-1 [a]	936	Sales price	2014
		G-2	900	Appraisal precedent (auction)	2011
	H	H-1	920	Sales price	2013
		H-2 [a]	930	Sales price	2014
		H-3	1100	Appraisal precedent (auction)	2011
5 (2016)	I	I-1 [a]	985	Appraisal precedent (auction)	2015
	J	J-1 [a]	985	Sales price	2015

Notes: AC = Appraisal companies, CoSLP = Comparative standard land parcel, CoTLP = Comparative target land parcel. [a] Comparative standard land parcels. The remainder is comparative target land parcels for the revision of other factors in comparative standard land parcels.

In an analysis of factors that influence pricing in the sales comparison approach, Yang and Yoo [38] have argued for the importance of selecting/applying appropriate cases, as well as that decision-making, should be based on objective criteria for individual factors. They also argue that the other factors category is in urgent need of revision, to ensure fairness by minimizing discrepancies in the application rate of sales prices by each standard land parcels. Byeon [40] has indicated that among the factors determining appraisal prices, the official land prices of standard land parcels, individual factors, and other factors have a strong influence on pricing. Keeping in mind that individual or other factors are based on appraisers' subjective criteria, more expert knowledge in appraisers and techniques for independently quantifying these factors is required.

Differences between appraisal companies in determinations of unit price based on official land prices for comparative standard land parcels, individual factors, and other factors range from 100.0% (case 4; the same amount) to 109.7% (case 1–2), which are within the permissible range of 110%. However, differences between determined unit prices and final appraisal prices varied greatly depending on the companies involved, ranging from KRW 0 (case 4) to KRW 18,916 thousand (case 1–2). In the individual factors belonging to the subjective factors, even though each case is in the same place, the difference in value varies from as little as 0.005 (cases 1–1 and 2) to as many as 0.043 (cases 3 and 4) among appraisers. Furthermore, for other factors, in all cases except cases 3 and 5, the difference between the values was as little as 0.05 (case 4) to as many as 0.1 (cases 1–1, 1–2, 1–3, and

2). As a result, there was a clear difference in the calculated unit price of each case. Therefore, in each case except for case 4 (the determined unit price is the same due to a slight difference in the calculated unit price), the unit price determined was all evaluated differently despite being in the same place, and this resulted in a difference in the final appraisal price. (Table 4). Discrepancies in appraisal price resulting from differences between appraisers' evaluation criteria can undermine the credibility of forest owners. For this reason, accurate evaluations of forests that include both land area and standing trees are needed. To this end, a higher level of expert knowledge and ongoing training of appraisers are required, to assure forest owners of both the credibility and fairness of appraisal results.

Table 4. Determination of unit price for private forest by case and final appraisal price.

Case		AC	AVoL	TiAd	ReF	InF	OthF	CUP	DUP	Ar	AP
1 [a]	1-1	A	600	1.00606	1.00	0.740	1.40	625	620	303,174	187,967,880
		B	600	1.00606	1.00	0.748	1.50	677	680	303,174	206,158,320
	1-2	A	600	1.00606	1.00	0.760	1.40	642	640	315,273	201,774,720
		B	600	1.00606	1.00	0.774	1.50	701	700	315,273	220,691,110
	1-3	A	600	1.00606	1.00	0.800	1.40	676	670	83,603	56,014,010
		B	600	1.00606	1.00	0.810	1.50	733	730	83,603	61,030,190
2		C	320	0.99972	1.00	0.796	2.05	520	520	1,044,694	543,240,880
		D	320	0.99972	1.00	0.788	1.95	491	490	1,044,694	511,900,060
3		E	840	1.01164	1.00	1.203	1.20	1230	1230	132,396	162,847,080
		F	840	1.01164	1.00	1.160	1.20	1183	1180	132,396	156,227,280
4		G	490	1.01256	1.00	1.653	1.40	1150	1160	175,331	203,383,960
		H	490	1.01256	1.00	1.610	1.45	1158	1160	175,331	203,383,960
5		I	560	1.00440	1.00	1.133	1.55	988	990	30,446	30,141,540
		J	560	1.00440	1.00	1.155	1.55	1007	1010	30,446	30,750,460

Notes: AR = Appraisal region, AC = Appraisal company, AVoL = Appraisal value of the land (KRW/m^2), TiAd = Time adjustment, Ref = Regional factors, InF = Individual factors, OthF = Other factors, CUP = Calculated unit price (KRW/m^2), DUP = Determined unit price (KRW/m^2), Ar = Area (m^2), AP = appraisal price. [a] Case 1 is an appraisal that considered 3 case standard land parcels as a case.

4. Conclusions

The KFS has been pursuing a national forest expansion policy since 1992, intending to strengthen the efficiency of forest management by continuous expansion and consolidation of national forests. As a result, between the years 1992 and 2015, the area of national forests under KFS jurisdiction increased by 17.4%. Among these, areas acquired through private forest purchases account for the largest portion of 69%. Although the purchase method for private forests is a well-established component of the national forest expansion policy, three of its most problematic aspects have been identified here: the selection process for appraisal companies; the non-inclusion of standing tree value; and ambiguities in appraisal criteria. Accordingly, the study proposes some ways of improving the ongoing process of purchasing private forests in the implementation of the national forest expansion policy.

In the first place, the largest factor in private forest purchases is the determination of the price for the agreement. As explained earlier, to ensure fairness and reliability two different appraisal companies are selected on the recommendation of the KFS and the forest owner. However, the selection process in itself may lead to disputes over fairness, since both the KFS and the forest owner have a direct stake in the outcome of the sale. For this reason, our first proposal is that appraisal

companies should be selected from a neutral institution or via a competitive bidding method, as a means of building public confidence in the appraisal process itself.

Secondly, as explained earlier, because in forest appraisals a distinction is made between standing trees and forest land, these two categories need to be appraised separately. However, it was found that standing tree value tends to be disregarded in appraisals due to the absence of motivation on the part of the KFS. As a result, appraisal companies tend to treat standing trees as of only marginal economic value or conflate it with the forest land category. To resolve this issue, we have recommended establishing appropriate criteria for estimating standing tree value, arguing for the urgent need for a database system for calculating the price of standing trees in private forest purchases. It is also necessary to introduce a system for appraisal by linking appraisal companies with forest-related organizations such as the NFCF.

Thirdly, the appraisal criteria currently used by appraisers, including estimating the value of standing trees and other factors, are limited to their subjective experience and knowledge. For this reason, to obtain more independent appraisals, there is a need to develop greater expertise in forest appraisal.

This study was limited in the number of appraisal cases it was able to collect because of the Korea Personal Information Protection Act. Nevertheless, it is hoped that its findings will be of value as a policy study that highlights the value of standing trees and will contribute to the continuation of national forest expansion through the purchase of private forests.

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