

# Forest Damage by the 13th Typhoon in 1993 and Forest Insurance Contracts in Kagoshima Prefecture

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## Introduction

Recently, Kagoshima Prefecture experienced a large typhoon, and forest resources were severely damaged. The 17th, 18th and 19th typhoons in 1991 damaged all of Japan in September 1991. The total damage in the agriculture, forestry and fishery industries was estimated at 710 billion yen. The 19th typhoon in 1991 damaged forest resources on Kyushu Main Island, especially in the northern part. Kagoshima Prefecture is located at the southern part of Kyushu Main Island, and the forest resources were damaged by the typhoon. The 13th typhoon in 1993 damaged the southern part of Kyushu Main Island again, mainly, Kagoshima Prefecture, and the total damage excluding that to manpower and buildings in Kagoshima Prefecture was estimated at 92 billion yen. Forest resources and forestry facilities were damaged severely by the typhoon. Many artificial forests under private ownership were damaged, and repairs are continuing even now.

One of the important economic countermeasures against damage to non-national forests by natural disasters is the forest insurance system. Forest management is a long-term nature-dependent business, and there are many kinds of risks. We have three systems for forest insurance, i.e., government forest insurance managed by the Forestry Agency of the Government of Japan under the Forest Insurance Special Accounting Act, Mutual Relief of Forest Damage (*Shinrin Saigai Kyousai*) managed by Japan Forest Owners Association (*Zenkoku Shinrin Kumiai Rengoukai*) and fire insurance managed by private non-life insurance companies. The former two insurance systems are popular. The insurable risks under these two insurance systems are fire, 6 types of natural calamities (storms, floods, snow, droughts, frost and high tide) and damage caused by volcanic eruption. Forest insurance and the subsidy program to promote the repair of damaged forest are two important policies for non-national damaged-forest resources.

In this paper, the current status and problems in the forest insurance system in Kagoshima Prefecture are examined, using a case study of the forest damage caused by the 13th typhoon of 1993. The results of our questionnaire survey on typhoon damage and forest insurance are also shown. Finally, changes in the risks of forest management and the role of forest insurance are discussed.

## Forest Insurance Contract in Kagoshima Prefecture

### 1. Government forest insurance

The area and amount of insurance provided by government forest insurance in Kagoshima Prefecture each year since 1952 is shown in Fig. 1. The covered forest area has shown a tendency to decrease since fiscal 1969 when the area peaked at 19,625 ha. In fiscal 1993, the area decreased to 8,545 ha, only 43.5% of the peak. The main reason is the decreased volume of various forestry practices, for example, planting, reforestation and thinning. However, the cost of insurance premiums has tended to increase, and recently it has plateaued despite the decreasing tendency of the covered area, because the average age of the insured area has been increasing.

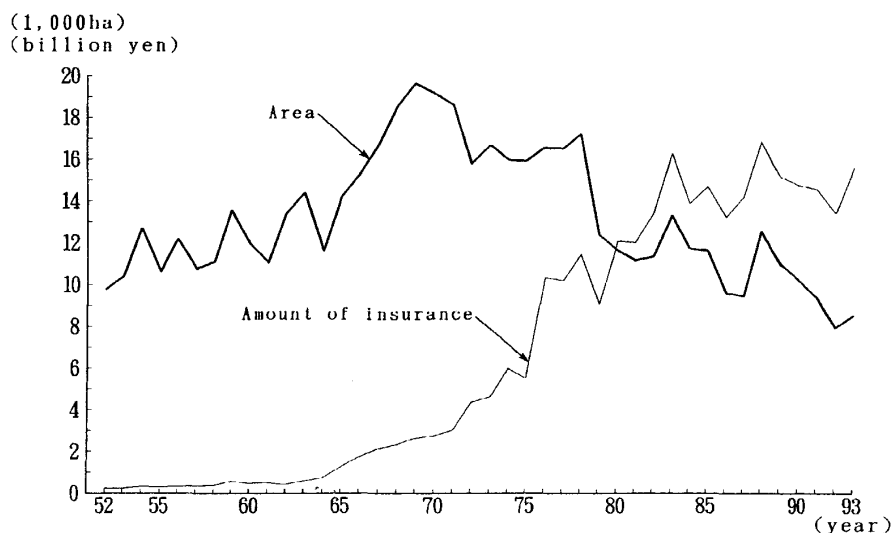


Fig. 1. Area insured by government forest insurance in Kagoshima Prefecture.  
Source : Kagoshima Prefectural Government.

The insurance premium and the insurance indemnity per year are shown in Fig. 2. The insurance premium has been above the insurance indemnity as a trend, but the situation reversed in fiscal 1965, 1967, 1968, 1970, 1992 and 1993. The figures for the most recent 2 years were as follows: the insurance premiums and insurance indemnity were 82 million yen and 114 million yen, respectively, in fiscal 1992; 86 million yen and 108 million yen in fiscal 1993. The ratio of insurance indemnity to insurance premiums was 139.0% and 125.6% in fiscal 1992 and 1993, respectively.

The total number of claims and the total insurance indemnity during these 2 years (fiscal 1993–1994) classified by the kind of disaster were as follows: wind damage, 930 claims, 202,452,000 yen (91.4% of the total insurance indemnity); flood damage, 157 claims, 17,534,000 yen (7.9%); tide-water damage, 2 claims, 618,000 yen (0.3%); damage from drought, 1 claim, 388,000 yen (0.2%); frost damage, 1 claim, 338,000 yen (0.2%); and fire damage, 2 claims, 206,000 yen (0.1%). Most of the payments in Kagoshima prefecture during these 2 years were for wind damage or flood damage.

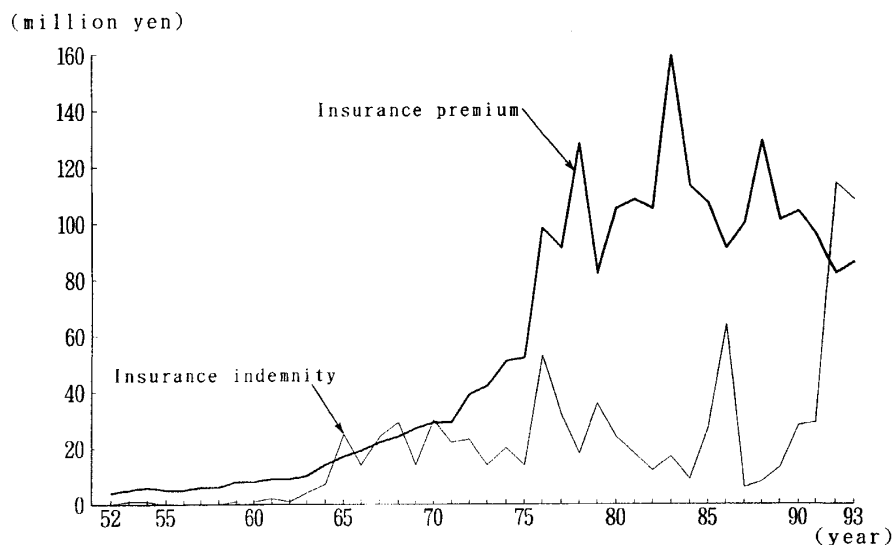


Fig. 2. Insurance premium and insurance indemnity of government forest insurance in Kagoshima Prefecture.  
Source : Kagoshima Prefectural Government.

## 2. Mutual relief of forest damage by Japan Forest Owners Association

Fig. 3 shows the number of claims and the amount of insurance covered by the Mutual Relief of Forest Damage managed by the Japan Forest Owners Association. The number of claims has been increasing since fiscal 1980, and the amount of insurance has tended to increase since fiscal 1959. The area covered has also tended to increase. In fiscal 1993, there were 6,958 claims, and the total amount of insurance was 12,187 million yen.

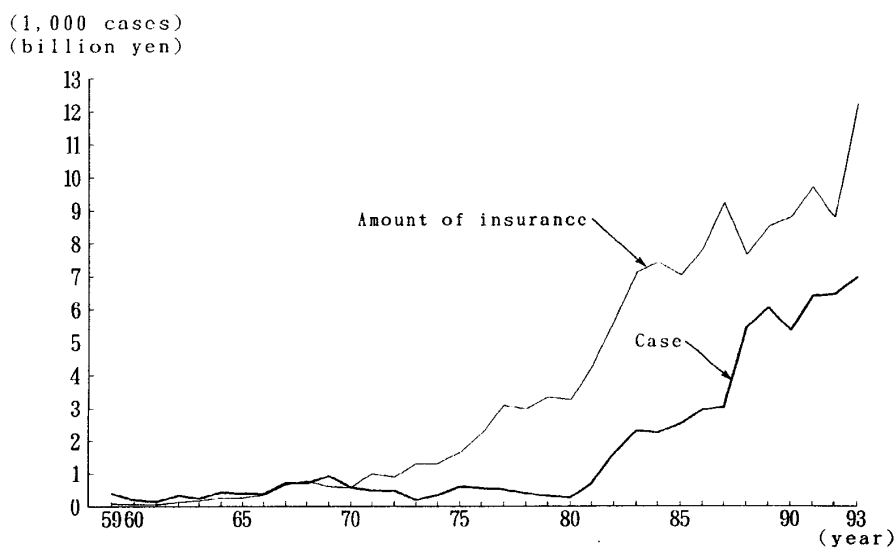


Fig. 3. Area insured by Mutual Relief of Forest Damage in Kagoshima Prefecture.  
Source : Kagoshima Prefecture Forest Owners Association.

The insurance premiums and the insurance indemnity for Mutual Relief of Forest Damage are shown in Fig. 4. Most years, the amount of insurance premiums was greater than the insurance indemnity. This was particularly clear before fiscal 1984. However, this relationship reversed in fiscal 1985, 1986, 1992 and 1993. The figures for the current 2 years were as follows: the insurance premiums and the insurance indemnity were 73 million yen and 145 million yen, respectively in fiscal 1992; 89 million yen and 542 million yen in fiscal 1993. The ratio of insurance indemnity to insurance premiums was 198.6% and 609.0% in fiscal 1992 and 1993, respectively.

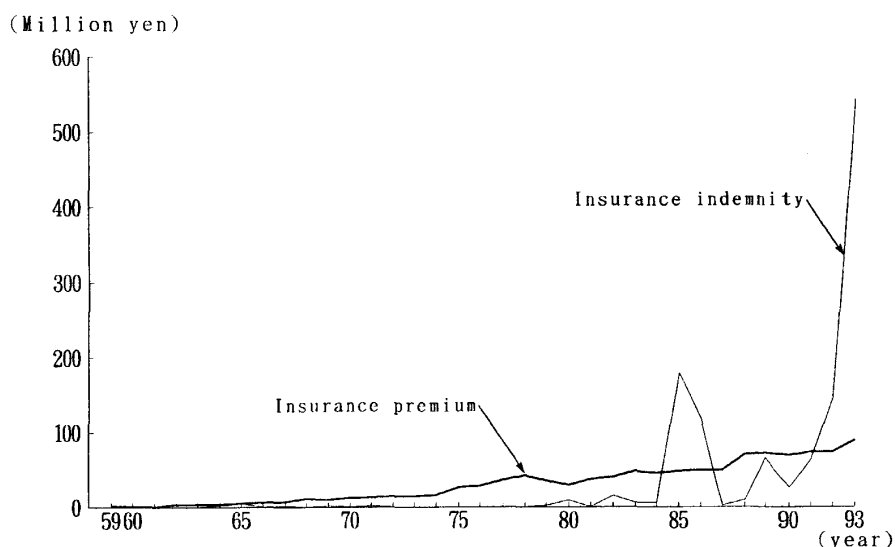


Fig. 4. Insurance premium and insurance indemnity of Mutual Relief of Forest Damage in Kagoshima Prefecture.  
Source: Kagoshima Prefecture Forest Owners Association.

The number of claims and the insurance indemnity classified by the kind of disaster during the recent 2 years (fiscal 1992–1993) were as follows: wind damage, 4,822 claims, 678,152,000 yen (98.6% of the total indemnity); flood damage, 40 claims, 9,061,000 yen (1.3%); fire damage, 1 claim, 122,000 yen (0.0%). Most of the insurance indemnity was incurred as wind damage during typhoons. In calculating the total amount of insurance indemnity during fiscal 1959–1984 by simply adding the annual amounts without adjusting for inflation, the amount by flood damage was greater than that by wind. The increased indemnity due to wind damage is a recent change.

### Forest Owners' Attitude to Forest Insurance

#### 1. The 13th typhoon in 1993

The 13th typhoon in 1993 formed on August 29 at lat.  $19^{\circ} 50' N$ . and long.  $138^{\circ} E$ ., and landed at the southern part of Satsuma Peninsula of Kagoshima Prefecture at 16:00 on September 3. The strength of the typhoon reached a maximum of 925 hpa of central atmospheric pressure and winds of 50 meter per second at 18:00 on September

2. This was the biggest typhoon to attack the southern part of Kyushu Main Island in the past 50 years. Osumi Peninsula of Kagoshima Prefecture is located at the eastern side of the typhoon's route, and damage in this area was severe. In addition, Kagoshima Prefecture was attacked by heavy rain during July 31 and August 1 and localized torrential downpour on August 6 in 1993.

The abnormal weather in 1993 influenced almost all industries in Kagoshima Prefecture. The 13th typhoon in 1993 caused 33 deaths, 15 severe injuries and 160 minor injuries. The damage to dwellings were as follows: 226 houses were completely destroyed (leaving 530 people homeless), 706 houses were almost completely destroyed (1,794 people homeless), 31,899 partially destroyed houses (83,356 people homeless), 5,284 flooded houses (13,588 people homeless), and the total damage to dwellings and the total number of persons left homeless were 38,115 houses and 99,268 persons, respectively. The number of damaged buildings other than dwellings was 3,124. The total amount of damage except for the loss of manpower and buildings was 91,752 million yen, and a breakdown is shown in Table 1. The various facilities were also disrupted and the damage to agriculture and forestry accounted for 45.5% of the total damage.

Table 1. Total damage by the 13th typhoon of 1993  
(million yen, %)

Classification	Amount* <sup>1, 2</sup>	Percentage* <sup>2</sup>
Sanitation and welfare* <sup>3</sup>	2,683	2.9
Agriculture	29,863	32.5
Fishery	2,216	2.4
Forestry	11,956	13.0
Commerce and industry	8,006	8.7
Public facilities* <sup>4</sup>	33,977	37.0
School facilities	2,665	2.9
Others* <sup>5</sup>	387	0.4
Total	91,752	100.0

Source : Kagoshima Prefectural Government.

\*1 Damage during September 1 to 3, 1993.

Excluding loss of man power and damage of buildings.

\*2 Subtotal does not agree with the total because figures have been rounded off.

\*3 Facilities for welfare, sanitation, foods, water service, disposal of waste matter and health.

\*4 River, seaside, erosion control, steep slope, road, bridge, port and the other public facilities.

\*5 Police and facilities owned by Kagoshima Prefectural Government.

Damage to forestry caused by the typhoon is shown in Table 2, and the total amount of damage was estimated to be 11,956 million yen. The net production of forestry in Kagoshima Prefecture in fiscal 1989, 1990 and 1991 was 16,199, 15,434 and 14,611 million yen, respectively. Thus the total damage to forestry ranged from 70% to 80% of the annual net production. Severe damage to forestry was also found in standing trees and landslides on forest land. The area of damaged artificial forests was 6,528 ha, of which 2,666 ha are planned to restore. The total area of privately owned artificial forests in Kagoshima Prefecture was 221,068 ha at the end of fiscal 1993. The ratio of damaged forest was calculated to be 3.0% overall in Kagoshima prefecture, and was higher locally. Landslides occurred in 145 places, and the total area of forest so damaged was 25.08 ha. Facilities for processing forest products were also damaged. The main damaged forest products facilities were the shiitake mushroom facilities (the estimated amount of damage was 180 million yen), bamboo forest and wild plant facilities (175 million yen), spur road (66 million yen), and log distribution facilities (34 million yen).

Table 2. Forest related damage by the 13th typhoon of 1993  
(million yen, %)

Classification	Quantity* <sup>1</sup>	Value* <sup>1</sup>	
		Amount* <sup>2</sup>	Percentage
Landslide of forest land	145 places	3,711	31.0
Facilities for erosion control	4 places	199	1.7
Forest road	10,949 m	951	8.0
Facilities for forest products	—	491	4.1
Standing trees	2,666 ha* <sup>3</sup>	6,603	55.2
Total		11,956	100.0

Source : Kagoshima Prefectural Government.

\* 1 Damage during September 1 to 3, 1993.

\* 2 Subtotal does not agree with the total because figures have been rounded off.

\* 3 Area of forest which is planned to restore.

## 2. Questionnaire on the damage caused by the 13th typhoon in 1993

### (1) Forest damage

Using a questionnaire, we obtained information on typhoon damage and forest management in Osumi Peninsula of Kagoshima Prefecture, the area in which the damage was most severe. The questionnaire was mailed to 2,616 forest owners who were representative members of 10 forest owners associations in the research area. The survey was conducted in July and August 1994, almost one year after the damage from the 13th typhoon occurred. We received 629 responses (the response ratio was 24.0%). The

following results were obtained from this survey.

The number of forest owners with property damaged by the 13th typhoon in 1993 is shown in Table 3. Although it is difficult to describe the degree of forest damage simply, we separated forest damage into 2 simple categories, i.e., serious damage and slight damage as assessed by the forest owners. Overall, 89.0% of forest owners responded that their forest was damaged by the typhoon to one degree or another. The percentage of owners reporting serious damage was 35.8%, and this ratio is very high (see Note 1).

Table 3. The number of forest owners who incurred damage  
(Number, %)

Degree of damage	Person	Percentage
Serious damage	195	35.8
Slight damage*	290	53.2
No damage	60	11.0
Total	545	100.0

\*Including damage of which the degree was not clear  
(28 persons, 51.1%).

The degree of damage, number of trees and cost are shown in Table 4, Table 5, and Table 6, respectively. The percentages of no response shown in these 3 tables are high. This no-response category includes situations where the degree of forest damage is not yet clear since the damage was too severe, although generally, it seems that quantitative damage was slight. Table 4 shows the area of damaged forest. Approximately half of the owners indicated that the area of damage was less than 1 ha. The number of forest owners with a damaged area less than 0.1 ha and 0.5

Table 4. Area of damaged forest (Person, %)

Area	Total		Serious damage		Slight damage	
	Person	Percentage	Person	Percentage*	Person	Percentage*
Under 1 ha	151	48.7	54	37.8	97	58.1
1 – 2ha	88	28.4	50	35.0	38	22.8
2 – 3ha	24	7.7	13	9.1	11	6.6
3 – 4ha	7	2.3	5	3.5	2	1.2
4 – 5ha	5	1.6	4	2.8	1	0.6
5 – 10ha	9	2.9	6	4.2	3	1.8
10 ha and over	26	8.4	11	7.7	15	9.0
Total	310	100.0	143	100.0	167	100.0
Total area* (ha)	865.5		500.1		365.3	
Average area (ha)	2.8		3.5		2.2	

\* Subtotal does not agree with the total because figures have been rounded off.

ha were 10 and 99, respectively. The largest contiguous area of damage was 70 ha. The average area of damaged forest per forest owner was 2.8 ha. The total area of damaged forest was 865.5 ha, of which 500.1 ha (57.8%) was seriously damaged. The area of damaged forest was larger than 10 ha for 26 forest owners (8.4%), who were heavily affected by the typhoon, which influenced their forest management decisions.

Table 5 shows the number of damaged trees. The average number of damaged trees was 313 per owner, while the largest number of damaged trees at any one site was 6,000. Ten forest owners who lost less than 10 trees indicated serious damage, while 5 forest owners who lost more than 1,000 trees indicated slight damage. As the size of privately owned forests varied, it is difficult to discuss the influence of forest damage using the number of damaged trees only.

Table 5. Number of damaged trees (Person, %)

Number of tree	Total		Serious damage		Slight damage	
	Person	Percentage	Person	Percentage*	Person	Percentage
Under 100	154	41.6	10	7.1	144	62.6
100–200	71	19.2	30	21.4	41	17.8
200–300	41	11.1	26	18.6	15	6.5
300–400	21	5.7	9	6.4	12	5.2
400–500	13	3.5	8	5.7	5	2.2
500–1,000	37	10.0	29	20.7	8	3.5
1,000 and over	33	8.9	28	20.0	5	2.2
Total	370	100.0	140	100.0	230	100.0
Total number	115,896		85,250		30,646	
Average number	313.2		608.9		133.2	

\* Subtotal does not agree with the total because figures have been rounded off.

Table 6 shows the estimated cost of forest damage. The average cost was 1,172,000 yen. The maximal figure was 50 million yen. Approximately 70% of forest owners answered less than 1,000,000 yen. Among forest owners that indicated slight damage, approximately 90% list the cost as less than 1,000,000 yen damage. The average cost for slight damage was 311,000 yen, 12.5% of the average cost for severe damage, 2,494,000 yen.

The species of damaged forest is shown in Table 7. Artificial forests of sugi (*Cryptomeria japonica*) and hinoki (*Chamaecyparis obtusa*) account for most of the damaged area. These two species are most popular on the Japanese mainland for artificial planting. Almost all of the forest owners who incurred damage from the typhoon had planted sugi. It is notable that broad-leaf forest, mostly natural forests, were also damaged by the 13th typhoon in 1993 to some degree. Generally, damage to natural broad-leaf trees was not considered damage in disaster surveys by Kagoshima Prefectural Government.



Table 6. Amount of damage (Person, %)

Amount (1,000 yen)	Total		Serious damage		Slight damage	
	Person	Percentage	Person	Percentage	Person	Percentage*
Under 1,000	180	70.3	41	40.6	139	89.7
1,000-2,000	42	16.4	28	27.7	14	9.0
2,000-3,000	13	5.1	12	11.9	1	0.6
3,000-4,000	7	2.7	6	5.9	1	0.6
4,000-5,000	3	1.2	3	3.0	0	—
5,000-10,000	6	2.3	6	5.9	0	—
10,000 and over	5	2.0	5	5.0	0	—
Total	256	100.0	101	100.0	155	100.0
Total amount (1,000 yen)	300,021		251,850		48,171	
Average amount (1,000 yen)	1,172		2,494		311	

\* Subtotal does not agree with the total because figures have been rounded off.

Table 7. Species of damaged forest (Number, %)

Species	Person* <sup>1</sup>	Percentage* <sup>2</sup>
Sugi ( <i>Cryptomeria japonica</i> )	433	92.1
Hinoki ( <i>Chamaecyparis obtusa</i> )	231	49.1
Other needle-leaved trees	8	1.7
Broad-leaved trees	37	7.9
Mixed	10	2.1

\* 1 Plural answers.

\* 2 Percentage of the number of persons who answered this question (470 persons).

## (2) Forest insurance on the damaged forest

Table 8 shows the insurance coverage of the forests damaged by the 13th typhoon in 1993. Since 59.6% of forest owners who incurred damage did not have any forest insurance at the time of the survey, they cannot file insurance claims at all. Of course, they can recover their forests using the re-plantation subsidy program, but they must accept a financial loss in long-term forest management. Overall, 24.4% and 8.0% of owners were insured by the Mutual Relief of Forest Damage and the government forest insurance, respectively. Very few forest owners contracted both government forest insurance and Mutual Relief of Forest Damage (4 persons, 0.9%). To calculate the percentage of forest owners without any forest insurance classified by the degree of damage, the ratio of the forest owners incurring severe damage was 49.7% and that of those incurring slight damage was 66.1%. Although this was not proven until the results were released, the forest owners who incurred severe damage had forest insurance more often than those incurring slight damage.

Table 8. Insurance covering the damaged forest  
(Number, %)

Forest insurance	Person* <sup>1</sup>	Percentage* <sup>2</sup>
Government forest insurance	36	8.0
Mutual relief of forest damage	110	24.4
The others	6	1.3
Unclear whether covered or not	36	8.0
Not insured	269	59.6

\* 1 Plural answers.

\* 2 Percentage of the number of persons who answered this question (451 persons).

The number of forest owners who incurred forest damage during the 13th typhoon, but did not receive payment for insurance claims was 44 persons, or 31.4% of the number of forest owners who answered this question. As shown in Table 5, Table 6 and Table 7, the degree of damage varied. For government forest insurance, the minimum payment for insurance claims was 2,000 yen. As the minimal payment was set at such a low level, almost all of the forest owners who incurred damage could receive some payment. Nevertheless, 33.4% of forest owners who could have received payment did not report the damage.

The reasons they did not file a claim were as follows (plural answers, there were 40 forest owners answering this question): the damage was slight, 20 persons (50.0%); the cumbersome process of filing claims, 9 persons (22.5%); the payment would be small, 8 persons (20.0%); others, 6 persons (15.0%). Though this partially included forest owners whose forests were only slightly damaged, the amount of damage was more than 2,000 yen in all cases. This is part of the evidence showing the indifference of forest owners toward forest insurance. In addition, the cumbersome process, generally found in the Japanese public sector, causes the situation to deteriorate.

### (3) Forest insurance on the total managed forest

Table 9 shows the insurance coverage for all managed forests of the forest owners responding our questionnaire. Approximately 60% of forest owners do not have any forest insurance. Judging from these findings, it was concluded that the general interest in forest insurance is still low in this study area. More surprisingly, 10.1% of forest owners could not answer whether their forests are insured or not. Such a finding would not be obtained regarding other non-life insurance policies. The ratio of owners obtaining coverage from the Mutual Relief of Forest Damage and government forest insurance is 20.0% and 16.5%, respectively. Twelve persons and 5 persons contracted government forest insurance and Mutual Relief of Forest Damage, respectively, after the 13th typhoon. Eighteen forest owners had forest insurance provided by private insurance companies. However, the forest insurance provided by private non-life insurance companies is not

popular in Japan, so it seems likely that these owners mistook the fire insurance on their dwellings for forest insurance, because the additional premium for fire insurance of forests is higher than that for other forest insurance premiums. From this perspective, it is clear that understanding of the forest insurance system is insufficient.

Table 9. Insurance coverage of total managed forest (Person, %)

Forest insurance	Total		Before typhoon* <sup>3</sup>		After typhoon* <sup>3</sup>	
	Person* <sup>1</sup>	Percentage* <sup>2</sup>	Person* <sup>1</sup>	Percentage* <sup>2</sup>	Person* <sup>1</sup>	Percentage* <sup>2</sup>
Government forest insurance	92	16.5	80	14.4	12	2.2
Mutual relief of forest damage	111	20.0	106	19.1	5	0.9
Private insurance company	18	3.2	18	3.2	0	0.0
Unclear on forest insurance	56	10.1	—	—	—	—
Not covered	333	59.9	—	—	—	—

\* 1 Plural answers.

\* 2 Percentage of the number of persons who answered this question (556 persons).

\* 3 The 13th typhoon of 1993.

As shown in Table 8 and Table 9, over a half of forest owners do not have any forest insurance in this area. The reasons they do not insure their forests are shown in Table 10. There are two important reasons. One is that the contents of forest insurance system are not well known to forest owners. As this point is an important problem for the forest insurance system, it will be discussed in detail in the following section. The other reason is that the value of the forest was considered low, because the area was small, the age-class of the trees was low and timber prices were low. The answer of forest owners that incurred serious damage shows almost the same pattern as that of the overall responses, but the percentages on the contents of forest insurance, for example, insurance premium, insurance indemnity and objective of insurance, were higher. It seems that forest owners are not satisfied with the present forest insurance system. The responses of forest owners with an area larger than 5 ha (number=65) were as follows: insurance system is not clear, 43.1%; value of forest is low, 33.8%; objective of insurance is unsatisfactory, 15.4%; insurance premium is high, 13.8%; area of forest is small, 13.8%. Percentages of reasons related to the contents of the current forest insurance system were high. However, the percentage related to knowledge of the forest insurance system is almost equal to the number of forest owners. Therefore, the degree of concern for forest insurance can not be explained solely by the size of the forest owned.

Table 10. Reasons for no insurance (Number, %)

Reason	Total		Serious damage	
	Person* <sup>1</sup>	Percentage* <sup>2</sup>	Person* <sup>1</sup>	Percentage* <sup>3</sup>
Insurance premium is high	20	6.9	10	14.5
Insurance indemnity is low	14	4.8	7	10.1
Objective of insurance unsatisfactory	16	5.5	7	10.1
Assessment of damage is strict	14	4.8	6	8.7
Insurance system is not clear	122	41.9	34	49.3
Procedure is difficult	4	1.4	2	2.9
Area of forest is small	86	29.6	20	29.0
Value of forest is low	117	40.2	14	20.3
Others	9	3.1	2	2.9

\* 1 Plural answers.

\* 2 Percentage of the number of persons who answered this question (291 persons).

\* 3 Percentage of the number of persons who incurred serious damage (69 persons).

The 13th typhoon also caused severe damage to forests and forestry facilities in Kagoshima Prefecture. Did this damage influence the forest owners' attitude toward forest insurance? Table 11 shows the answer regarding change in forest owners' attitude to forest insurance before and after the 13th typhoon in 1993. This question was aimed at forest owners whose forests were not insured. Overall, 29.1% of forest owners' view of forest insurance changed for the positive, and they indicated willingness to examine future insurance for their forests. Especially in case of the forest owners incurring serious damage, the percentage of positive responses was 42.3%. Even forest owners who incurred slight or no damage, the percentage was not negligible, 25.9% and 23.6 %, respectively. In this sense, the forest damage due to the 13th typhoon focused forest owners' attention on the risks in forest management. Since Kagoshima Prefecture is located on the course of frequent typhoons, forest owners must consider the risk of natural calamity in advance.

Table 11. Change in attitude toward forest insurance after the 13th typhoon of 1993<sup>1</sup> (Number, %)

Amount	Total		Serious damage		Slight damage		No damage	
	Person	Percentage* <sup>2</sup>	Person	Percentage	Person	Percentage	Person	Percentage
Positive* <sup>3</sup>	97	29.1	33	42.3	43	25.9	21	23.6
Negative* <sup>4</sup>	165	49.5	34	43.6	92	55.4	39	43.8
No answer	71	21.3	11	14.1	31	18.7	29	32.6
Total	333	100.0	78	100.0	166	100.0	89	100.0

\* 1 This question was for the forest owner whose forest was not insured at the time of the survey.

\* 2 Subtotal does not agree with the total because figures have been rounded off.

\* 3 Will examine forest insurance from now on.

\* 4 No thought of insuring their forests after the 13th typhoon.

## Discussion

### 1. Ratio of insured forest and extension activities

It is important that the forest insurance system works well so that many forest owners will obtain forest insurance. Table 12 shows the area of insured forest by age-class. At the end of fiscal 1993, the total area of privately owned artificial forests was 221,068 ha in Kagoshima prefecture, of which 33,835 ha and 33,883 ha are insured by the government forest insurance and the Mutual Relief of Forest Damage, respectively, and the percentages of contract of forest insurance are both equal to 15.3%. Totally, only 30.6% of artificial forests are insured in Kagoshima Prefecture.

Table 12. Area of insured forest by age-class\*<sup>1</sup> (ha, %)

Age-class	Area of artificial forest* <sup>2</sup>	Type of insurance			Ratio of insured forest		
		Government forest insurance	Mutual relief* <sup>3</sup>	Total	Government forest insurance	Mutual relief* <sup>3</sup>	Total
I ( 1- 5 year)	4,245	4,114	102	4,216	96.9	2.4	99.3
II ( 6-10 year)	10,307	8,621	143	8,764	83.6	1.4	85.0
III (11-15 year)	19,006	3,567	1,033	4,600	18.8	5.4	24.2
IV (16-20 year)	33,341	4,773	4,433	9,206	14.3	13.3	27.6
V (21 year and over)	154,169	12,760	28,172	40,932	8.3	18.3	26.5* <sup>4</sup>
Total	221,068	33,835	33,883	67,718	15.3	15.3	30.6

Source : Kagoshima Prefectural Government.

\* 1 At the end of fiscal year 1993.

\* 2 Only non-national forest.

\* 3 Mutual Relief of Forest Damage.

\* 4 Subtotal does not agree with the total because figures have been rounded off.

Examining the ratio of insured areas by age-class, two types of forest insurance show a clear contrast. For government forest insurance, the ratio of insured forests in age-class I (1-5 years) and age-class II (6-10 years) was 96.9% and 83.6%, respectively. Almost all newly planted artificial forests are insured under the government forest insurance, but the ratio of age-class IV and over (21 year and over) was only 8.3%. Most forest owners get a subsidy for new planting. At that time, a contract for government forest insurance is required by the regional forest owners association. Of course, continuing the contract for forest insurance depends on the forest owner. For Mutual Relief of Forest Damage, the ratio shows an increasing tendency as the age-class increase. Examining the overall ratio, nearly one fourth of age-class III and over (11 year and over) are insured.

The reason such a different ratio is demonstrated in Table 12 is due to the methods of contracting each type of forest insurance. In most cases, forest owners do not pay

the premium for forest insurance separately. Especially, planting or thinning are done using several kinds of subsidies from the government of Japan, the bill which the forest owner accepts already includes the fee of forest insurance in the total. Thus, some forest owners pay the insurance premium without knowing it. This is also the reason that some forest owners do not know even whether their forest is insured or not, as shown in Table 8 and Table 9. Certainly such a method is easy for administrative sections, but the forest owner's awareness of forest insurance will not increase, and the potential for renewal of the contract remains at a low level. Thus, the ratio is clearly reduced for age-class III (11–15 years) in Table 12.

## 2. Extension of forest insurance

One reason forest owners' awareness of the forest insurance system is not always at a high level is the poor extension policy. At first, the method of notifying owners that the forest insurance contract needs to be renewed is not effective. For government forest insurance, the insurance contract notice is brought to the forest owner (see Note 2). For the Mutual Relief of Forest Damage, there are no notices to the forest owner. Of course, the forest owner can receive materials which include the contents of Mutual Relief of Forest Damage for the local forest owners association or prefectural forest owners association. Accordingly, most forest owners do not know the details of forest insurance. This is a rare situation in the non-life insurance industry in Japan.

As previously indicated, most forest insurance is contracted when the planting or thinning is performed under subsidy. Why do forest owner not continue insuring their forests when the insurance is expired? One reason is that there are no notices advising forest owners of the expiration of their forest insurance. Frequently, the contract has expired before the forest owner becomes aware of it. In 1993, Kagoshima Prefecture Forest Owners Association started to mail notices of expiration and a brochure (abstract of the Mutual Relief of Forest Damage) to some insured forest owners when their insurance (Mutual Relief of Forest Damage) expired. In 1994, this association started to send the same materials to all forest owners whose forest insurance expired during the year. Such an activity should be practiced, not only for commercial reasons but also for long-term extension of forest insurance. There are only a few prefectures with such an activity already in existence. In 1994, Kagoshima Prefecture Forest Owners Association sent the notice and brochure to 6,000 forest owners, and 800 of them renewed coverage. Usually, approximately 100 forest owners renew independently, for example, public forests or forest owners who borrowed money using his forests as security. Thus, the effect of this new advertisement is clear.

Since the 13th typhoon in 1993 damaged many private forests in Kagoshima prefecture, the owners must report the damage to obtain insurance immediately (see Note 3). However, there were no reports prepared by administrative offices in the severely damaged

area. Kagoshima Prefecture Forest Owners Association announced positive reporting to the local forest owners association in September 12, 1994, almost one year after the 13th typhoon in 1993. The suggestion to the local forest owners association by the prefectural association is as follows: notifying the forest owners directly, for example by phone; usage of community meetings; contacting to representatives of community; printing articles in the newsletter of local forest owners association and in public relations magazines published by municipalities. However, the local forest owners association did not always move positively. To promote the forest insurance system effectively, it is necessary to improve activity regarding forest insurance at the level of the local forest owners association, the most familiar office for the general forest owner.

The area of insured forest classified by forest ownership is shown in Table 13. The ratio of forests owned by municipalities is 54.4%, while that of prefectural forest is only 16.8%. The prefectural government has been promoting forest insurance in the private forest sector, but their own forests are still not sufficiently insured. To promote forest insurance to the private forest persuasively, the ratio of insured public forests must increase, especially in case of prefectural forest.

### 3. Forest management and forest insurance

Generally, forest management involves several types of risk. The main reason for this is that it takes over 50 years from planting to final cutting. During the long production-period, there is a fair risk of damage from fires, insects, typhoon and the other causes. Forest insurance is a basic economic policy for the reduction of the risk. Changes in the risks in forest management in Kagoshima prefecture are summarized as follows.

First, the estimated value of private forests has been increasing, because the age of artificial forests which were planted after the Second World War are coming to cutting age. The area of artificial forest of non-national forest of Kagoshima Prefecture classified by age-class in 1990 is as follows: age-class I (1–5 years), 7,301 ha (3.3%); age-class II (6–10 years), 17,552 ha (8.0%); age-class III (11–15 years), 29,929 ha (13.6%); age-class IV (16–20 years), 44,407 ha (20.1%); age-class V (21–25 years), 37,445 ha (17.0%); age-class VI (26–30 years), 36,585 ha (16.6%); age-class VII (31–35 years), 24,801 (11.2%); age-class VIII and over (36 years and over), 22,706 ha (10.3%). In 1990, the percentage of age-class VIII and over (36 years and over) was not high, but age-class VII (31–35 years) comprised 11.2%. The age-class in this area will become age-class VIII (36–40 years) in 1995, this area is expected to be cut in the near future. The actual cutting time is unknown because these forests are owned privately. However, the value of trees, especially those in the age-class near the final cutting age, has been increasing. The increase in tree value causes an increase in the potential damage in the value basis.

Second, the increase in artificial forest is one of the increased risks in forest

Table 13. Area of insured forest by forest ownership\*<sup>1</sup> (ha, %)

Forest ownership	Area of artificial forest	Type of insurance			Ratio of insured forest		
		Government forest insurance	Mutual relief* <sup>2</sup>	Total	Government forest insurance	Mutual relief* <sup>2</sup>	Total
Private forest	190,677	21,410	31,492	52,902	11.2	16.5	27.7
City, town and village	25,819	11,656	2,391	14,047	45.1	9.3	54.4
Prefectural forest	4,572	769	—	769	16.8	—	16.8
Total	221,068	33,835	33,883	67,718	15.3	15.3	30.6

Source : Kagoshima Prefectural Government.

\* 1 At the end of fiscal year 1993.

\* 2 Mutual Relief of Forest Damage.

management. Traditionally, private forests are used for many purposes in a local community, for example, timber production, fuel-wood production and so on. However, recently, the economic interest of the forest owner tends to be limited to the artificial forests, most of which are planted with haplophase needle-leaved trees, and generally, needle-leaved trees are more vulnerable than broad-leaved trees during a typhoon. Moreover, the Forestry Agency of the Government of Japan has used the subsidy system to promote the planting of needle-leaved trees to increase forest resources since the Second World War. As a result, the percentage of artificial forests has increased in area to 55.6% in Kagoshima Prefecture in 1990. There is a possibility that such a rapid increase in artificial forest results in an increased risk in overall forest management in Kagoshima Prefecture.

Third, the influence of changes in forest management techniques is noted. Traditionally, methods of forest management, for example, planting and thinning, are varied locally in Japan. However, the Japanese forestry policy, especially after the Second World War, has promoted a single planting system all over Japan, using the subsidy system. For example, it is necessary to plant more than a certain number of seedlings for the forest owner to obtain a subsidy. The combination of planting more than a certain number of seedlings and thinning is strongly recommended. Recently, thinning has been highly recommended, and a high rate of subsidy was established to encourage private forest owners to practice thinning. As a result, the percentage of forest in which thinning is already finished has reached a certain level, although the exact figure is unknown. Recently, the multi-storied forest has also been recommended (see Note 4). Though the relationship between such forest management and the 13th typhoon damage has not yet been clarified scientifically in Kagoshima Prefecture, it seems that regional forest management should consider that Kagoshima Prefecture is located on the course of frequent typhoons. It may be noted that nationally standardized forest management



contributed to an increase in damage, at least partially. In this sense, the policy of standardized forestry management must be reviewed immediately, and it is strongly recommended to begin research on forestry practices suitable to local conditions. Furthermore, concerning local forestry operations under such a specific conditions, the extension of forest insurance system must be recommended more strongly.

Finally, the decreasing tendency of concern for forestry management by forest owner is noted. Stumpage price has been decreasing recently in Kagoshima Prefecture (see Note 5). In addition to such an economic circumstance, the average age of the forest owners is advancing. The ages of the forest owners who answered our questionnaire were as follows: 20–49 years, 49 persons (8.0%); 50–59 years, 105 persons (17.1%); 60–69 years, 303 persons (49.4%); 70 years and over, 156 persons (25.4%); and the average age was 63.9 years. Most owners were over 60 years and make a living by annuity and agriculture. As a result the concern for forest land and forestry management has been decreasing, the ability to develop counter plans for forest damage has decreased to a certain degree, for example, the delay in salvaging the damaged trees. This point also contributes to the increased risk in forest management. As described above, the concern for forest insurance did not increase after the 13th typhoon in 1993 in Kagoshima Prefecture. This is also a good example of the decreasing interest in forestry management. It is possible that such a decrease in concern will increase a certain kind of risk in forest management.

## Conclusions

The 13th typhoon in 1993 caused damage to private forest management in Kagoshima Prefecture. Recently, the risks in forest management have been increasing and it seems that risks will continue to increase in the future. Especially, in case of the mature artificial forests, the estimated value of damage will increase. Forest insurance is an economic countermeasure to control risks in forest management. Generally, insurance is based on mutual aid, and to get a sufficient insurance indemnity under cheaper insurance premium, it is first necessary to increase the number of owners contracting forest insurance. Kagoshima Prefectural Government, Kagoshima Prefecture Forest Owners Association, local forest owners associations, and the other forestry or wood related associations must promote insurance contracts before this area is damaged by an extraordinary disaster again. Not only an increase in the number of contracts but also announcements of the contents and significance of forest insurance must be promoted at the same time. It is also important to promote an increase in the number of contracts in prefectures in which forest insurance has not yet been spread. It is also recommended that the forest insurance program must be improved and expanded by the Forestry Agency of the Government of Japan or Japan Forest Owners Association, based on the experience of the 13th typhoon.

It is worth noticing that the insurance system is not a unique countermeasure to control risks in forest management. Forestry is a long-term business with a risk. However protective the forest insurance system may be, it is of no importance if the forestry operations do not fit the local conditions and the concern for forest management is lacking. In other words, forest land can not be managed under such circumstances. The extension program on forestry, including the promotion of forest insurance, is also important for the reduction of risks in forest management.

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### Notes

- 1) These ratio are much higher than those calculated by the damage report prepared by Kagoshima Prefectural Government. There are many cases in which the degree of damage was slight. The amount of forest damage was calculated only for cases in which the damaged area was more than 0.1 ha and the percentage of damaged trees relative to all standing trees was more than 30 %.
- 2) This notice included the following information: location of forest, name of the forest owner insured, number of the insurance bond, period of insurance, species of forest, age of forest, area of forest, amount of insurance premium, and amount of expired insurance indemnity. This notice was not policy, and did not include the details of insurance clauses.
- 3) The damage to the forest must be reported within 2 years in cases of government forest insurance and Mutual Relief of Forest Damage.
- 4) Forestry Agency of the Government of Japan changed the Basic Plan of Forest Resources in 1987. Then, the extension of forest variety was emphasized. One of the techniques was the multi-storied forest. Thereafter, the local forest plan which must be created under the Basic Plan of Forest Resources had to include an increase of multi-storied forest without a detailed local survey.
- 5) The average stumpage price per 1 m<sup>3</sup> of sugi in Kagoshima Prefecture was as follows: 12,698 yen on March, 1971; 24,598 yen on March, 1975; 27,513 yen on March, 1980 (value shows a peak); 18,642 yen on March, 1985; 16,092 yen on March, 1990; 13,515 yen on March, 1993. The price in 1993 is down to 49.1% of that in 1980.

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\* The title is tentatively translated from the original Japanese title to the English title by the authors.