

Recent Change in Forestry and its Regional Difference in Tohoku District

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1 Introduction

Forestry has been one of the most important industry not only in terms of employment but also value of production in mountainous region of Japan. However, it is depressed these days because of structural change in Japanese industry ; stagnation of wood demand, low price of wood which is worsened by the increased importation of log. The consequences are the decrease in number of forestry workers and ageing of them.

Few studies have done on the regional differences of forestry region which have been struggling under the depression. Mori (*ed*) (1982) clarified the forestry region from many viewpoints by prefecture. And Soma (1982) whose study has done in Ehime Prefecture shows us the micro-scale regional differences of forestry region. Fujita (1984b) also discusses on micro-scale regional differences from the study on forestry region of central Japan.

The purpose of this paper is to trace the recent change in forestry in mountainous region of Tohoku District and also to show the regional difference of forestry. The study will cover the period from 1970 to date. This is the period when the Japanese forestry has dwindled. Since 1969, imported log has exceeded the half of total amount of wood supply in Japan (Fujita 1984a).

In this study, the all administrative unit of area, such as *shi*, *machi*, and *mura*, will be taken into consideration, in which forest land occupies more than 75% of the total land area. There are 149 such administrative areas in Tohoku District.

2 Some characteristics of forest in Tohoku District

In this chapter, some characteristics of forest in Tohoku District will be considered from the nationwide viewpoint.

2.1. Ownership of forest

The type of ownership of forest is an important factor prescribing forestry

activities. In Japan, as a whole, forest area accounts for 60% of total land area. And about 30% of the forest land is national forest and the rest are non-national ones. The national forest is not equally distributed in the country. Fig. 1 shows the ratio of national forest area to total forest area of each prefecture. It is clear that the ratios of Tohoku and Hokkaido Districts are remarkably high. This can be attributed to the historical background of setting up national forest in the 19th century¹⁾.

Tohoku District, as a whole, shows that 48.5% of its forest area is occupied by

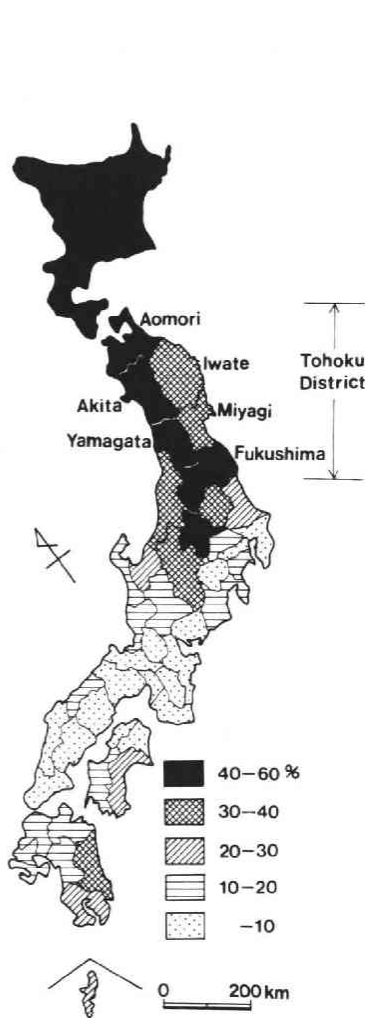


Fig. 1 Share of national forest.
Source: *Agriculture and Forestry Census of Japan, 1980*

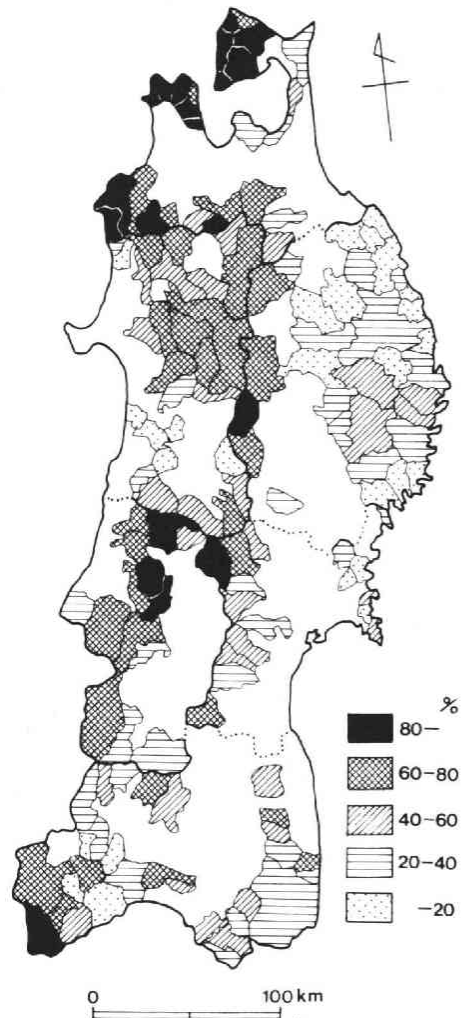


Fig. 2 Share of national forest in Tohoku District.
Source: see Fig. 1

national forest. There is a considerable difference among regions though (Fig. 2). Roughly speaking, it is high in the Sea of Japan side regions, especially in Aomori and northern Yamagata, and it is relatively low in the Pacific Ocean side.

2.2. Forest type

Here the ratio of acreage of artificial forest to wood land area is used to analyze. The artificial forest is defined here as forest which has come into existence by artificial

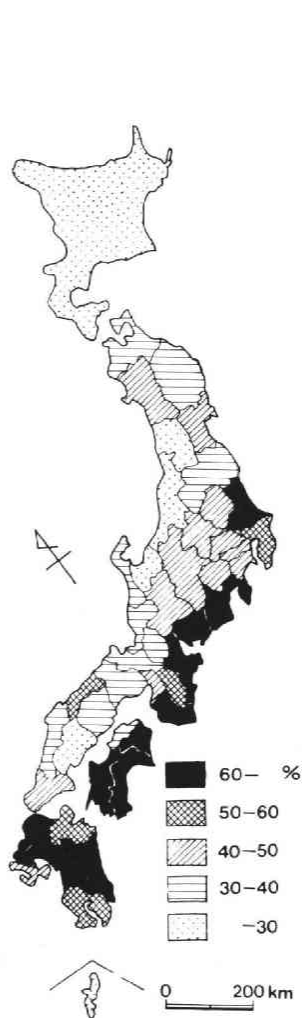


Fig. 3 Artificial forest ratio in 1980.
Source : see Fig. 1

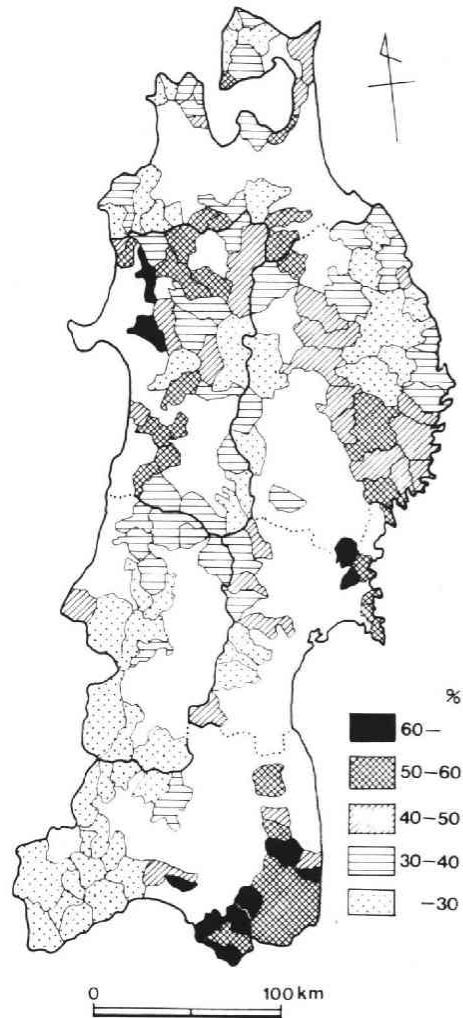


Fig. 4 Artificial forest ratio in Tohoku District, 1980.
Source : see Fig. 1

regeneration. It can be said that the ratio denote to some extent the intensiveness of forest utilization or forestry management (Mori (*ed*) 1982). Fig. 3 shows the ratio by prefecture. The average ratio of Japan is 40.4% in 1980. Prefectures in the Pacific Ocean side in central and western Japan show the high ratios, which indicates that forest utilization in these prefectures are relatively intensive. On the other hand, low ratio in the Tohoku District shows its relatively low utilization.

Fig. 4 shows artificial forest ratio in Tohoku District minutely. Main regions with high ratio are as follows ; eastern Fukushima, northeastern Miyagi, southeastern Iwate, and northern Akita. These regions can be regarded as relatively advanced regions in terms of forestry management in Tohoku. Contrarily, the rate is low in Yamagata and western Fukushima. Roughly speaking, regions with high ratio of national forest tend to have low level in artificial forest ratio (see Fig. 2). This is because many of the national forests have difficulties to be cutted by their locations in the heart of mountains and by the existence of many protection forest and natural park inside of them. In the Tohoku District totally, the artificial forest ratio is 31.2% in national forest, and 37.9% in non-national forest in 1980.

3 Analysis by cutting area

From here, forestry in Tohoku District will be analyzed. As forestry includes many activities such as silviculture, cleaning cutting, thinning, and regeneration

Table 1 Change in cutting area in Tohoku District, 1970-1986

Pref.	year	cutting area (ha)			changing rate (%)		
		clear cutting	selection cutting	total	clear cutting	selection cutting	total
Aomori	1970	5,290 (88)	714 (12)	6,004 (100)	-69.1	341.9	-20.2
	1986	1,637 (34)	3,155 (66)	4,792 (100)			
Iwate	1970	13,929 (92)	1,149 (8)	15,078 (100)	-58.1	102.5	-45.8
	1986	5,839 (72)	2,327 (28)	8,166 (100)			
Miyagi	1970	3,284 (92)	281 (8)	3,565 (100)	-55.1	145.9	-39.2
	1986	1,476 (68)	691 (32)	2,167 (100)			
Akita	1970	8,404 (96)	384 (4)	8,788 (100)	-58.3	126.8	-50.2
	1986	3,505 (80)	871 (20)	4,376 (100)			
Yamagata	1970	3,306 (96)	130 (4)	3,436 (100)	-62.6	18.5	-59.5
	1986	1,238 (89)	154 (11)	1,392 (100)			
Fukushima	1970	8,375 (91)	834 (9)	9,209 (100)	-60.3	-4.6	-55.2
	1986	3,326 (81)	796 (19)	4,122 (100)			
Total	1970	42,588 (92)	3,492 (8)	46,080 (100)	-60.0	128.9	-45.7
	1986	17,021 (68)	7,994 (32)	25,015 (100)			

() means the share (%)

Source : *Territorial Basic Forestry Survey*.

cutting, it's very difficult to grasp total forestry activities quantitatively. In this paper, regeneration cutting area is used as an index which reflects the forestry activities. Cleaning cutting and thinning are excluded here.

3.1. Change in cutting area, 1970-1986

Table 1 shows change in cutting area in the Tohoku District. At first, it can be pointed out that the total cutting area decreased 45.7% between 1970 and 1986. This means that there was rapid decline in productive forestry activity in the period.

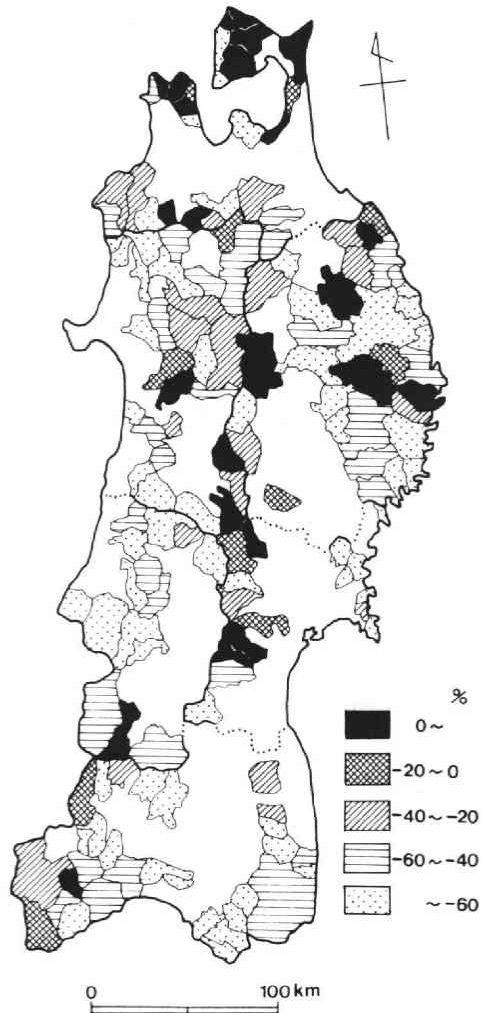


Fig. 5 Changing rate in cutting area, 1970-1986.
Source: see Table 1

Taking note of cutting method, it became clear that the area of clear cutting decreased remarkably, however the area of selection cutting increased contrarily. The reasons of increase in the latter are considered as follows; decrease in suitable land for artificial regeneration, failure in previous regeneration, short of fund or labor and so on. The area of selection cutting occupied only 8% of the total cutting area in 1970, but it increased to 32% in 1986. Table 1 also indicates that decreasing rate in Aomori is lower than those of other prefectures. This is partly because selection cutting was proceeded widely in Aomori. However, there should be many other reasons for this.

Fig. 5 shows more detail changing rate of cutting area in the same period. There are some regions in which cutting area increased. They are dispersed spatially, and no clear distribution pattern is discernible. Most regions, in which the area of cutting had increased or the decreasing rate of cutting area are low, are included in the regions where the national forest occupies a big share in the total forest area (see Fig. 2). This suggests that decrease in cutting area in national forest was smaller than that of non-national forest. It may be influenced by the "self-supporting system" policy in the national forest management. Cutting area in the national forest accounts for 60% of the total cutting area in 1986.

3.2. Regional difference in cutting

Fig. 6 was made to clarify the recent regional difference seen in cutting activity. Longitudinal axis shows cutting ratio (cutting area/forest area) in 1986, and lateral axis indicates artificial forest cutting ratio (artificial forest cutting area/cutting area) in 1986. Most of cutting in the regions with high level of cutting ratio seems to be done in the area of natural forest. This means that there are not many matured artificial forest in Tohoku District. Cutting area in the natural forest occupies 82% of the total cutting area in 1986. In the regions where the occupation rate of national forest are high, the main cutting is done in the natural forest (Fig. 6). This is because the ratio of artificial forest in the regions are low. On the other hand, no clear tendency is seen in the regions where the ratio of non-national forest are high.

To simplify the regional difference, all regions in Fig. 6 are categorized into 4 groups divided by two lines which indicate the average values of each indexes. Fig. 7 shows regional distribution pattern of these 4 groups. At first, there are not many regions included in group A, of which both cutting ratio and artificial forest cutting ratio are high. Most of them are located in eastern Fukushima or Aomori. Regions belonging to group B, of which cutting ratio and natural forest cutting ratio are high, are mainly distributed in northern part of Tohoku. This corresponds with the low ratio of artificial forest there (see Fig. 4). However, almost all regions in Yamagata and western Fukushima, which have low artificial forest ratio, are included in group D.

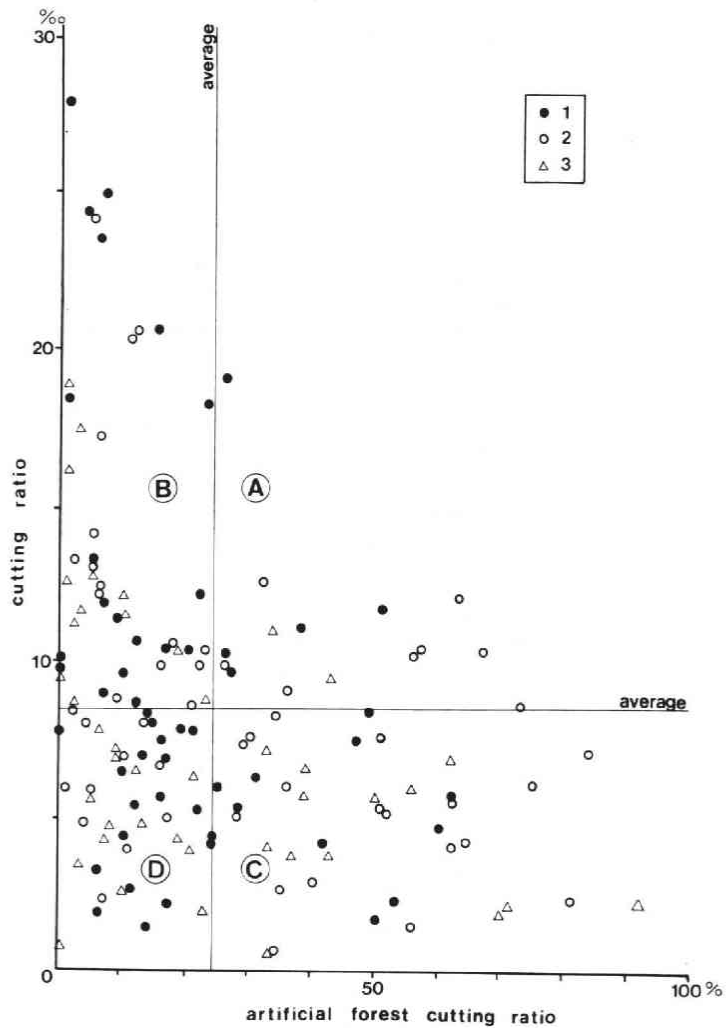


Fig. 6 Cutting ratio and artificial forest cutting ratio in 1986.

1: Share of national forest is more than 60%, 2: the same share is 30-60%, 3: the same share is under 30%.

Source: *Territorial Basic Forestry Survey in 1986. Agriculture and Forestry Census of Japan in 1980.*

It will be possible to comprehend the outline of regional difference in cutting in the Tohoku District by Fig. 7. However it is necessary to remind that cutting activity which is analysed here is only a part of forestry activities, and also that the data used here is the result for only one year 1986.

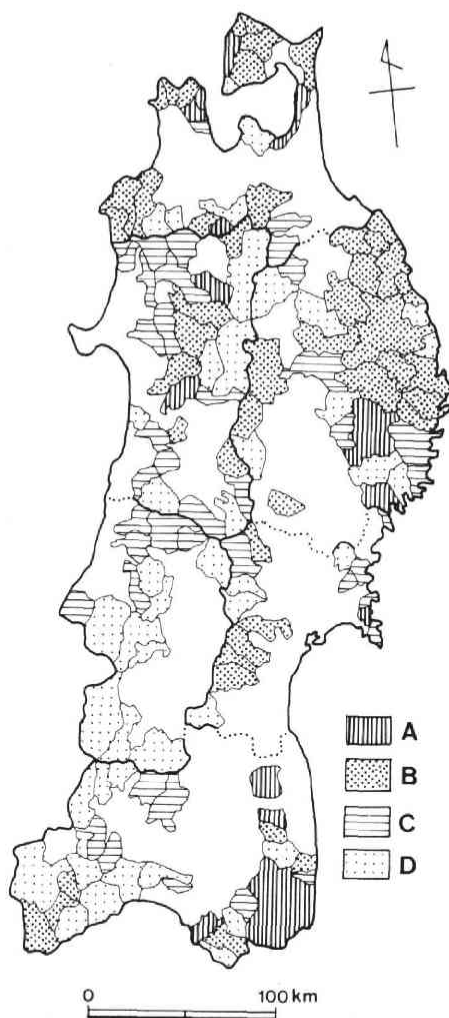


Fig. 7 Distribution of 4 groups in cutting.
 A, B, C, D: see Fig. 6.
 Source: see Fig. 6.

4 Analysis by forestry workers

In this chapter, the author attempts to analyze the change and regional difference in forestry by the type of employment of forestry workers.

4.1. Change in number of forestry workers, 1970-1980

Here all persons who engaged in forestry for more than one day in one year before

the survey are included as "forestry workers". Between 1970 and 1980, total number of forestry workers in the study area decreased at a rate of 32.6% (Table 2). Forestry workers are divided into two groups; "mainly self-employed" and "mainly employed by others". The latter experienced more severe decrease than the former (Table 2). The rate of decrease is 51.5%. Table 2 also shows that decreasing rate both of "self-employed" and "employed by others" are relatively low in Aomori, Akita, and Yamagata.

Fig. 8 shows changing rate in number of forestry workers in the same period more in detail. Regions, in which the number of forestry workers increased or the decreasing rates are low, are seen mainly in two areas. One is western Fukushima and another is northern Akita and Aomori. To say in different way, other regions experienced rapid breakaway from forestry. It seems that this is corresponding with the rapid expansion of labor market in the manufacturing sectors, which has been advanced from southern region of Tohoku District mainly in the Pacific Ocean side.

4.2. Regional difference in forestry employment

Fig. 9 shows regional difference in forestry employment in 1980. Longitudinal axis in Fig. 9 shows the ratio of forestry workers to the total employed in the age of 15 years old and over²⁾. Lateral axis indicates the ratio of the regular employed to the total forestry workers. The regular employed here means "persons who engaged in

Table 2 Change in number of forestry workers in Tohoku District, 1970-1980

Pref.	year	number of forestry workers			changing rate (%)		
		mainly self-employed	mainly employed by others	total	mainly self-employed	mainly employed by others	total
Aomori	1970	11,261 (84)	2,198 (16)	13,459 (100)			
	1980	9,157 (88)	1,223 (12)	10,380 (100)	-18.7	-44.4	-22.9
Iwate	1970	25,734 (77)	7,631 (23)	33,365 (100)			
	1980	17,029 (83)	3,427 (17)	20,456 (100)	-33.8	-55.1	-38.7
Miyagi	1970	7,042 (73)	2,660 (27)	9,072 (100)			
	1980	3,816 (78)	1,101 (22)	4,917 (100)	-45.8	-58.6	-49.3
Akita	1970	21,423 (76)	6,736 (24)	28,159 (100)			
	1980	18,189 (83)	3,622 (17)	21,811 (100)	-15.1	-46.2	-22.5
Yamagata	1970	13,277 (83)	2,676 (17)	15,953 (100)			
	1980	10,362 (89)	1,313 (11)	11,675 (100)	-22.0	-50.9	-26.8
Fukushima	1970	32,806 (88)	4,668 (12)	37,474 (100)			
	1980	21,710 (91)	2,200 (9)	23,910 (100)	-33.8	-52.9	-36.2
Total	1970	111,543 (81)	26,569 (19)	138,112 (100)			
	1980	80,263 (86)	12,886 (14)	93,149 (100)	-28.0	-51.5	-32.6

() means the share (%)

Source: *Agriculture and Forestry Census of Japan*

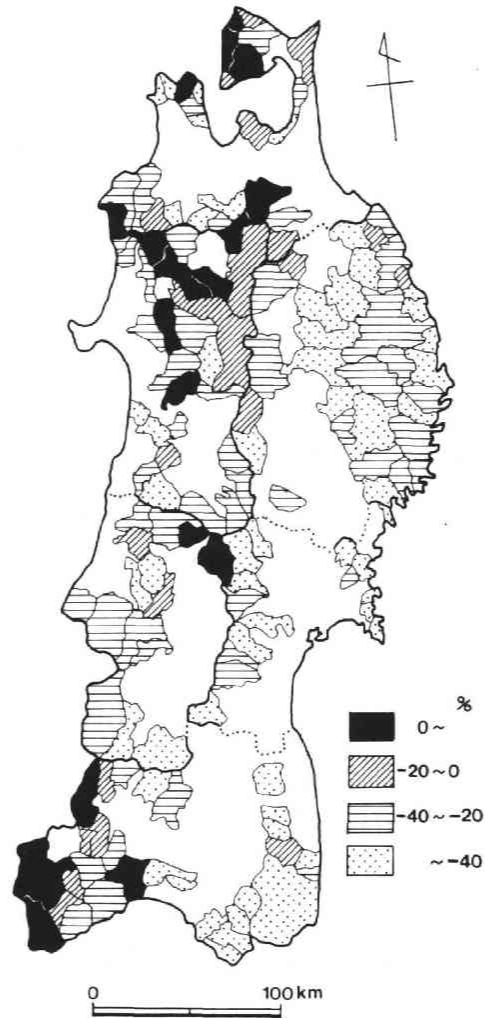


Fig. 8 Changing rate in number of forestry workers, 1970-1980.
Source: see Table 2

forestry for more than 150 days in one year". The low level of its average (7.8%) indicates that most of forestry workers are engaged in other occupations in a year. In Fig. 9, all the three regions which are classified by the rate of national forest are dotted on the coordinates from the viewpoint of employment ratio. No clear distribution pattern is recognized among them. However one characteristic feature can be pointed out that there are considerably many regions which have high ratio of national forest in the upper right part in Fig. 9. This suggests that forestry at national forest

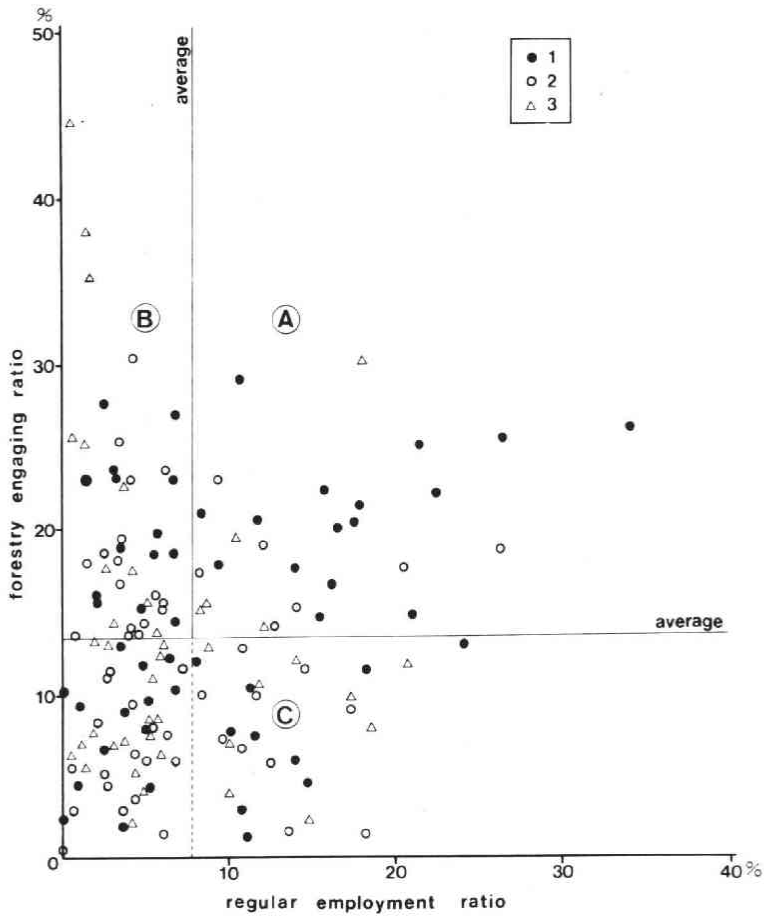


Fig. 9 Forestry engaging ratio and regular employment ratio in 1980.

1, 2, 3: see Fig. 6.

Source: *Agriculture and Forestry Census of Japan in 1980. Population Census of Japan in 1980.*

regions are offering stable employment opportunities.

Briefly speaking, all regions shown in Fig. 9 are divided into 3 groups by two lines indicating the average values of each indexes. Fig. 10 shows regional distribution pattern of these 3 groups. Regions belonged to group C, in which forestry engaging ratio is low, are distributed mainly in the Pacific Ocean side. They are regarded as regions in which forestry are not prosperous. Contrarily, in the Sea of Japan side, there are many regions where the forestry is relatively prosperous. Regions included in group A, which have high value in both indexes, are dispersed. However, most of them have one common character that they are interior mountain villages far from

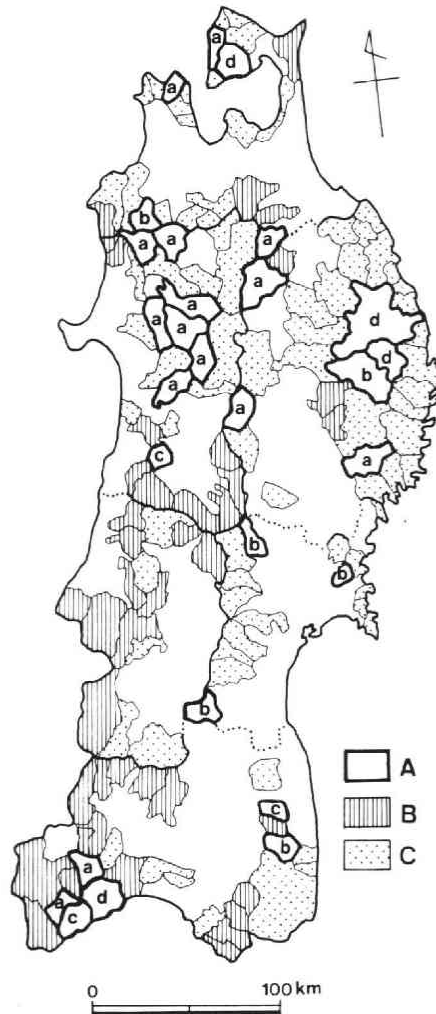


Fig. 10 Distribution of 3 groups in forestry employment.

A, B, C : see Fig. 9

a : principal employer is District Forestry Office, b : the same is forest owners' association, c : the same is company, d : the same is the others.

Source : see Fig. 9.

urban area. The author considers that Fig. 10 appropriately shows the recent regional difference of forestry in Tohoku District. In short, mountainous regions, in which forestry is comparatively prosperous, are almost limited to interior mountain villages in Tohoku today. In Fig. 10, the principal employer in the regions of group A are also shown. District Forestry Office is responsible to manage the national forest. It is

found as a principal employer in 15 regions out of 28 regions in group A. This suggests that national forest plays an important role in forestry in Tohoku.

5 Conclusion

In this paper, the author has tried to trace the recent change in forestry and then to clarify some regional differences of forestry in Tohoku District. The results can be summarized as follows.

1. Forest in Tohoku District are characterized by the high national forest ratio and low artificial forest ratio.

2. Total cutting area decreased remarkably from 1970 to 1986 in Tohoku. Although the acreage of clear cutting had decreased remarkably, that of selection cutting had increased. Decreasing rate of cutting area in non-national forest was bigger than that of national forest.

3. Most of cutting is done on the natural forest still now in Tohoku. And the northern Tohoku is the region where the cutting activity is relatively prosperous.

4. Total number of forestry workers considerably decreased from 1970 to 1980 in Tohoku. The number of "mainly employed workers by others" had decreased more severely than that of "mainly self-employed workers". And it is the Pacific Ocean side regions which experienced more remarkable decrease of them.

5. Finally, as it is anticipated, almost all regions, where forestry is prosperous industry in terms of forestry engaging ratio and regular employment ratio, are located at interior mountain area far from urban area. And there District Forestry Office plays an important role as principal employer.

Acknowledgement

The author wishes to thank Prof. K. Itakura of Tohoku University for his helpful advice on this study.

Notes

- 1) These districts raised an objection against central government at that time. And the right of ownership of forest was not clear there.
- 2) The employed living in Densely Inhabited District (DID) in *shi* were excluded.

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