

Tourism and Forest Recreation on Yakushima Island

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Introduction

Japan consists of 6,852 islands including the 4 main islands of Honshu, Shikoku, Kyushu and Hokkaido, Okinawa, the Northern Territory, Takeshima, and uninhabited islands. Under the Detached Island Promotion Law of April 1, 1992, 332 islands are designated as populated islands, and the development of tourism has recently been promoted on many islands.

Yakushima is one of the Osumi Islands located to the south of Kyushu Island. Yakushima is well-known for its Sugi (*cryptomeria japonica*) trees some of which are over 1,000 years old. The oldest tree on this island, Jomon-Sugi, which is 25.3 m in diameter at breast height (D.B.H.), 16.4 m tall, and estimated to be from 2,000 to 7,200 years old, is a symbol of Yakushima, and it is estimated that more than 10,000 people a year view this tree as one of the highlights of their sight-seeing trip to Yakushima. The recent drastic increase in the number of visitors to Yakushima is thought to be due to several reasons, which are discussed in a later chapter, including the improvement in transportation services, increased public concern for nature, and the registration of the island with Conservation for the Protection of World Cultural and Natural Heritage.

In this article, the recent development of tourism in Yakushima and changes in the number of visitors between 1972 and 1993 revealed by statistical analysis, including the seasonal effect, are discussed. The reasons for increased tourism on Yakushima, the impact on forest recreation facilities in Yakushima, and important related problems confronting the Kagoshima Prefectural Government and Yakushima municipalities are discussed.

Abstract of Yakushima

Yakushima, located 60 km south of Sata Point, the southern most part of Kyushu Island, is the 9th largest island in Japan, including the Northern Territory (Etorofu Island and Kunashiri Island), with a total land area of 501.62 km², of which 179.19 km² of total land area is located within Kirishima-Yaku National Park, and total coastline length of 126.7 km.

The land use distribution (including Kuchinoerabu Island; see Note 1) is as follows: forest land is 48,883 ha (90.6%), farm land (cultivated land, meadows and pasture) 1,672 ha (3.1%), grassland 999 ha, roads 529 ha, land for building 482 ha, rivers and other bodies of water 209 ha, and other 1,201 ha. Forest land thus covers most of the island, and forestry has long been an important industry. Even now, forestry and forest resource-related tourism are important for the island development. The proportion of man-made forest, 27.4%, is low compared to the average for Kagoshima Prefecture, 56.0%, and thus a greater proportion of the natural forests has been preserved. According to the 1990 Agriculture and Forestry Census, the

proportion of national forests on Yakushima is 81.6% by area and 86.1% on a stock basis (Baba, 1994, p.21). Thus, the usage of the national forest is a key element in the overall economic development of this island.

According to the national census data, the population on October 1, 1990 was 13,658 and the number of households 5,274. The population distribution by age group was 2,940 persons 14 years old or less, 8,272 15 to 64 years old, and 2,446 65 years and over, with the last group representing 17.9% of the total population. The total number of employed persons was 6,247, of whom 1,459, 1,640, and 3,147, respectively, were employed in primary, secondary, and tertiary industries. Of those employed in primary industries, 1,001 were employed in agriculture, 180 in forestry, and 278 in fisheries, but it should be noted that the forestry category does not include those employed in lumber manufacturing, forest ownership, tourism-related forest resources, national forest management, and Prefectural Government management.

In fiscal year 1991, the number of visitors to Yakushima was 278,000, and the total accommodation usage was 149,000. The accommodation capacity was 927 persons in hotels and inns ("ryokan") and 823 persons in tourist homes ("minshuku").

Number of Visitors

1. Data and method

(1) Data

Because Yakushima is an island, it can not be entered other than by air or sea. While the number of people entering at airports or seaports can be determined with great accuracy, it is important to note that not all passengers are tourists. However, this ratio is estimated to have remained relatively at 52%, for the past 20 years, with a more recent increase to around 60% indicated by the results of new survey conducted by the Kamiyaku-cho Town Office.

(2) Method

Basic monthly data were subjected to time-series-analysis. Generally, in time-series-analysis, the original data (O) is divided into 3 components, i.e., a trend and cyclical factor (TC), seasonal factor (S), and irregular factor (I), with a multiplicative relationship, in which $O=TC \times S \times I$. In many methods TC is further divided into a trend factor (T) and cyclical factor (C), but in this study TC was used as a trend factor without separation. The EPA method of division of the original data into TC, S and I used in this study is described in Note 2. The statistical data for the total of 300 months during the 25-year researched period from 1969 to 1993 listed in Note 3 were subjected to time-series-analysis.

2. Trend factor

(1) Pattern of change of annual number of visitors

The annual number of visitors to Yakushima is shown in Table 1. The trend factor (TC) for the number of visitors to Yakushima is shown in Figure 1. The researched period showed 3 phases, in the first of which (1969 to 1974), the number of visitors showed linear annual increase. The number of visitors in 1974 was 2.5 times greater than that in 1969. In the second phase (1975 to 1988), the number of visitors was almost constant in the range of about 100,000-120,000. The third phase, from 1989 to 1993 was characterized by a rapid increase in the number of visitors from, 121,811 in 1988 to 161,159 (132.3%; percent of number in 1988), 168,822 (138.6%), 222,250 (182.4%), and 237,807 (195.2)%, respectively, in each successive year.

There was a twofold increase during the 4-year period. In 1993, the number of visitors showed a slight decrease.

Table 1. Number of visitors to Yakushima

(person, %)

Year	Total	Percentage by season			
		January -March	April -June	July -September	October -December
1969	46,976	21.6	23.2	35.0	20.2
1970	52,609	21.2	20.3	37.2	21.3
1971	67,456	19.2	20.5	36.4	23.5
1972	80,430	22.7	22.4	33.4	21.5
1973	97,419	20.3	21.3	37.5	20.9
1974	117,229	19.1	22.4	36.2	22.3
1975	102,071	19.5	22.4	36.6	21.5
1976	105,228	21.7	22.9	35.4	20.0
1977	105,304	20.3	23.4	35.0	21.3
1978	109,398	21.5	23.4	33.2	22.0
1979	116,505	20.2	23.7	34.9	21.2
1980	114,664	22.1	23.4	33.8	20.7
1981	115,188	19.9	23.7	34.2	22.2
1982	123,617	20.6	23.8	32.5	23.1
1983	114,284	21.2	22.6	33.3	22.9
1984	115,836	19.7	24.9	33.1	22.3
1985	113,741	22.0	24.1	32.7	21.2
1986	120,298	19.3	24.2	35.8	20.7
1987	115,364	20.2	24.6	34.0	21.3
1988	121,811	19.5	25.5	32.3	22.6
1989	161,159	14.9	25.3	35.6	24.2
1990	168,822	20.4	23.6	29.0	27.0
1991	222,250	22.9	28.7	29.8	18.6
1992	237,807	21.2	26.3	33.5	19.0
1993	215,045	25.2	27.4	28.2	19.3

Source : Kagoshima Prefectural Government, Kumage Branch Office. Yaku-cho Town Office.

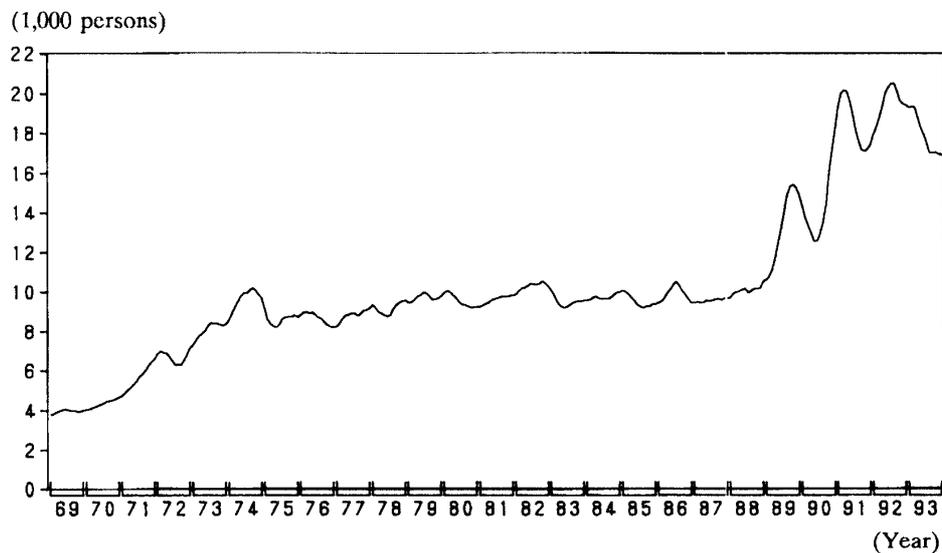


Fig. 1. Trend factor

(2) First phase (1969-1974)

The first phase was characterized by rapid increase in the number of visitors during all 4 seasons. During this period, southwestern Japan, especially southern Kyushu, was focused on as a sight-seeing destination. Among the activities of visitors to Yakushima during this period, mountain-climbing and visiting native forests were popular. The estimated average duration of a vacation to Yakushima was 3 to 5 days, and the residence of the visitor was most frequently Kyushu, Shikoku or Honshu (Kumamoto Regional Forestry Office, 1974).

The Kumamoto Regional Forestry Office of the Forestry Agency of Japan established Yakushima Recreational Forest (2 sites) in March 29, 1974. This forest area had already been used for recreation since 1971. The estimated annual number of users of the recreational forest in 1971-1973 is shown in Table 2, together with the projected annual number of visitors in 1974-1977. At the time, it was thought that this number would continue to increase after 1973, but this forecast did not materialize, mainly due to the change of the basic economic structure caused by the oil crisis.

Table 2. Number of users of recreational forest*

Year	Shiratani district		Arakawa district	
	Number	Yearly change	Number	Yearly change
1971	3,000		10,000	
1972	1,800	60	20,000	200
1973	3,100	172	60,000	300
1974	5,300	171	72,000	120
1975	7,600	143	86,400	120
1976	14,500	191	90,700	105
1977	22,700	157	95,300	105

Source: Kumamoto Regional Forestry Office, Forestry Agency, Japan Government.

*Estimated number of users (1971-1973).

Projected number of users at 1974 (1974-1977).

(3) Second phase (1975-1988)

Almost constant annual number of visitors to Yakushima was the major characteristic of this phase. By comparison, the annual number of visitors to Kagoshima Prefecture in 1969, 1974 (the peak year in the 1970's), and 1983 (the trough year in the 1980's) was 5,814,000, 8,218,000 and 6,936,000, respectively. The number of visitors in 1983 was 84.4% of that in 1974. In the latter half of the 1970's and the 1980's, the number of visitors to Kagoshima Prefecture generally decreased, as did that to southwestern Japan as a whole. On the other hand, tourism to foreign destinations and Okinawa Prefecture (which was returned to Japan in 1972 by the United States) was increasing. Under these conditions, the number of visitors to Yakushima remained at the same level. Mountain-climbing and visiting natural forests were again the main objectives of sight-seeing.

(4) Third phase (1989-1993)

In this phase, a rapid increase in the annual number of visitors was observed, but the pattern of increase did not show the regular linearity seen in the first phase. Because of the

large yearly changes during this phase, the seasonal change showed great variation. For example, the peak month in 1989, 1991, and 1992 was October, March, and August. Figure 2 shows the monthly number of visitors to Yakushima in 1988, 1990 and 1992. The increase during each year is distributed rather uniformly over all months, and the quarterly percentage of visitors therefore did not change markedly.

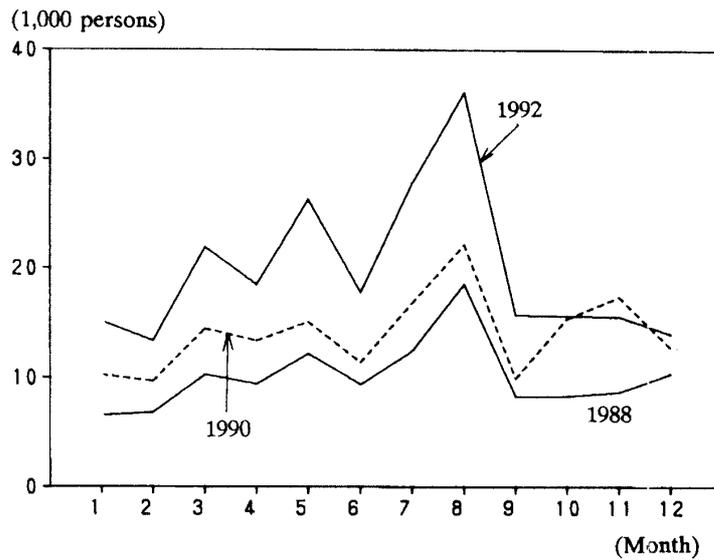


Fig. 2. Number of visitors to Yakushima (1988, 1990, 1992)

3. Seasonal factor

(1) Seasonal index

The seasonal index of the number of visitor is shown in Figure 3. As the researched period was long and the pattern of fluctuation was not constant, variable seasonal index is used in this analysis. The peak month during the researched period was August. In this sense, Yakushima is a summer sight-seeing destination. However, the seasonal indexes in the peak months (about 200) are about three times those in the trough months (about 70). Thus,

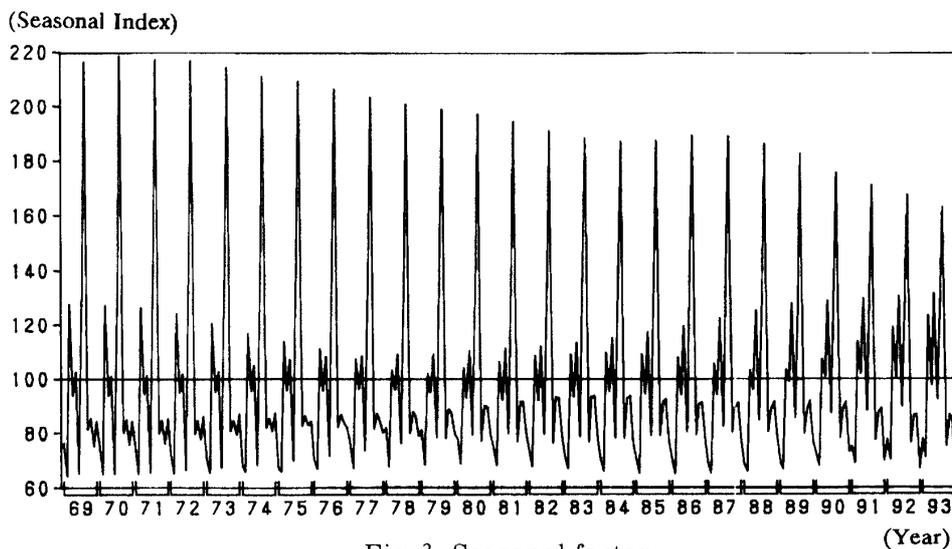


Fig. 3. Seasonal factor

though the number of users is increased in summer, tourism to this island occurs to a degree in all seasons.

To clarify the change of seasonality, the seasonal indexes in 1973 and 1993 are shown in Figure 4. Both these year show the common peak months of March, May and August, although March was second rank in 1973, and May in 1993. As schools are not in session in March (spring vacation) and August (summer vacation), the seasonal indexes in these two months have been consistently high. As there are several national holidays in succession during the first week of May (sometimes including the last several days of April), which is referred to as Golden-Week, and the tourist volume in May is characteristically very large.

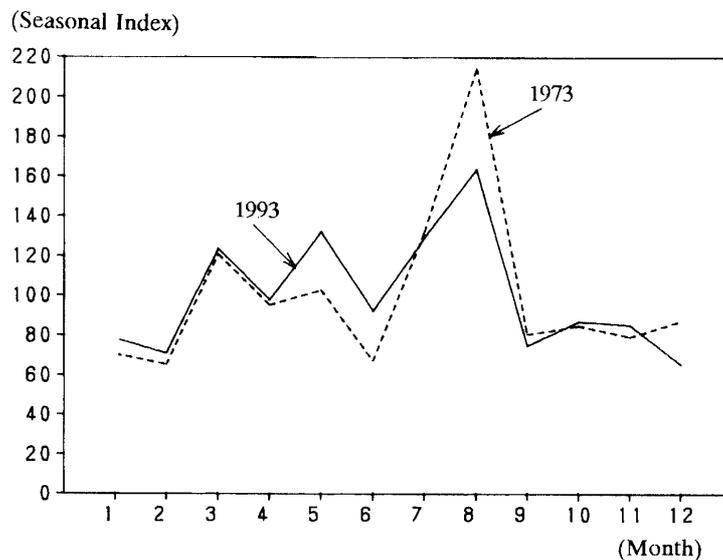


Fig. 4. Comparison of seasonal factor in 1973 and 1993

The pattern of increase in June is also worth notice. Generally, June is the rainy season in Japan. The monthly precipitation in Yakushima in July, 1990 was 828.0 mm (meteorological observation site, Yaku-cho Town Office in Onoaida). In addition to the rainy weather condition, there are no national holidays in June, and the seasonal index of June in 1973 was the second lowest following that of February. However, the number of visitors to Yakushima in June is recently increasing as a result of the increasing adoption of the five-day work week and improvements in transportation to Yakushima.

The highest seasonal index, observed in August, has decreased 50.9 points, from 214.4 in 1973 to 163.5 in 1993. In 1993, the minimum seasonal index was 65.4, in December, and the ratio of the maximum index to the minimum index was 2.5, compared to 3.3 in 1973. The amplitude of the seasonal index has decreased, and the seasonality of the number of visitors has grown weaker.

As the basic database used in this analysis was the total number of visitors to Yakushima, this seasonal index includes the local inhabitants. Figure 5 shows the number of persons in 1991 and 1992 who entered Yakusugi Museum (Note 4), one of the major sight-seeing destinations in Yakushima, for reference. There was a clear seasonal effect which was higher than that for the total number of visitors to Yakushima. As the seasonal index shown in this paper also includes the usage by local inhabitants, there is a possibility that the

seasonality factor has a stronger effect on tourism than the calculated index presented in this paper.

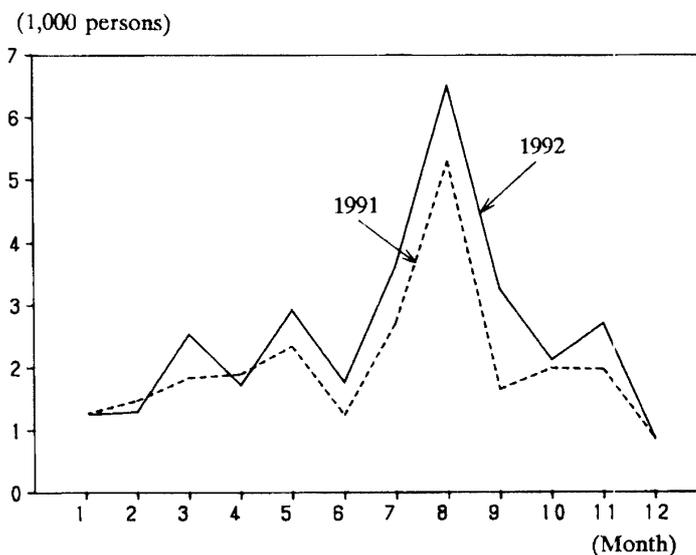


Fig. 5. Number of visitors to Yakusugi Museum

(2) Recent patterns in peak season

As discussed above, the recent seasonal index has peaks in March, May and August. As the number of holidays in May is lower than that during the spring and summer vacations, in the analysis of visitors per day, that for May shows abnormal pattern. In this section, the visitor per day on each of the 10 days from April 29 to May 8 in 1994 is examined as an example of a period with abnormal pattern.

The total number of visitors to Yakushima during this 10-day period was 10,513, of whom 2,000 (19.0%) enter by airplane, 3,620 (34.4%) by high-speed ship, and 4,893 (46.5%) by ferryboat (Note 5). As the number of seats on the airplane and high-speed ship is limited, the ferryboat plays an important role during the peak season. The average number of visitors per day to Yakushima during this period was 1,051, in contrast to 589 for 1993 as a whole; thus, the rate during the abnormal period is almost double the average.

The daily number of visitors to Yakushima on each day was as follows (Note 5): April 29 (Green Day), 1,553.5; April 30 (Saturday), 1,319.5; May 1 (Sunday), 1,635.5; May 2, 1,328; May 3 (Constitution Day), 1,437.5; May 4 (National holiday), 836; May 5 (Children's Day), 873; May 6, 449; May 7 (Saturday), 412.5; and May 8 (Sunday), 668.5. The peak day was May 1. The number of visitors was near the capacity for accommodations in Yakushima (1,838 persons in April 1, 1994), and the local newspaper printed an account of the appeal by Yakushima municipal offices that visitors refrain from entering the island without reserving accommodations during this season (*Minami Nihon Newspaper*, April 26, 1994).

Discussion

1. Transportation

(1) Present condition

The major ports of entry to Yakushima are one airport (Yakushima Airport) and one seaport (Miyamoura Port), and the other seaports are mainly used for fishery. Yakushima Airport was classified as a third-class airport in 1962. There are presently three round-trip flights a day between Yakushima Airport and Kagoshima Airport, one of the main domestic airports in Japan which is a destination for a few international airlines. The flight time is 40 minutes. The aircraft is a YS-11, with passenger capacity of 64. In July, 1991, an unscheduled airline began operation between Yakushima Airport and Makurazaki Airport, located in a city (population, 28,794; 1990 national census) in southern Satsuma Peninsula, Kagoshima Prefecture. The flight time is 40 minutes, and the aircraft are a Cessna (passenger capacity, 3) and an Islander (9).

There are two ferryboats, one providing daily round-trip service between Kagoshima Main Port and Port Miyamoura (3 hours and 50 minutes one way), and the other providing the same service over the course of two days (4 hours one way). The former ferryboat was renewed in April, 1993 (Note 6). The high-speed ship (passenger only), provides direct service from Kagoshima Main Port to Port Miyamoura (only 1 hour and 45 minutes one way). The high-speed ship connects Kagoshima Main Port, with Port Ibusuki (a famous hot spring

Table 3. Number of visitors to Yakushima by mode of transportation
(person, %)

Fiscal year	By ship	By air	Total	Percentage by ship
1977	76,695	30,736	107,431	71.4
1978	75,339	34,110	109,449	68.8
1979	78,287	40,022	118,309	66.2
1980	71,091	41,196	112,287	63.3
1981	73,939	43,710	117,649	62.8
1982	77,403	45,049	122,452	63.2
1983	70,647	44,879	115,526	61.2
1984	69,799	48,204	118,003	59.2
1985	65,486	46,451	111,937	58.5
1986	66,763	47,688	114,451	58.3
1987	65,605	50,214	115,819	56.6
1988	69,021	53,128	122,149	56.5
1989	121,559	49,925	171,484	70.9
1990	140,763	46,706	187,469	75.1
1991	172,404	49,361	221,765	77.7
1992	186,721	54,759	241,480	77.3
1993	153,028	56,191	209,219	73.1

Source : Kagoshima Prefectural Government, Kumage Branch Office. Yaku-cho Town Office.

resort city in Kagoshima Prefecture), Port Miyanoura, and Port Nishinoomote (a main city on Tanegashima Island located to the east of Yakushima).

The annual number of visitors to Yakushima classified by mode of transportation is shown in Table 3. The number of airline passengers increased during the period 1977 and 1988, reaching 53,000 in 1988. It decreased to 46,706 in 1990, but it has increased thereafter since 1989. The annual number of passengers during the most recent 10-year period has been almost constant at about 50,000. On the other hand, the number of passengers by ship increased almost threefold between 1988 and 1992. It is an important characteristic that almost all of the recent increase in the number of visitors is due to those entering Yakushima by ship. The high-speed ship began operation in 1989, and it is clear that this transportation improvement has greatly contributed to the increase in the number of visitors.

Land transportation on Yakushima is provided by one commercial bus company, which offers 18 round-trip services a day linking the main communities along the coast. The total usage in fiscal year 1989 was 480,000 (Kagoshima Prefectural Government, 1992, p.91). There are 9 round-trip services a day linking the two main communities, Miyanoura and Anbou. There are also three taxicab companies with a total of 45 cabs, 5 car-rental agencies with a total of 130 cars, and 2 charter bus companies with a total of 16 buses. Taxis or rental cars are frequently used as transport to the entrances of mountain roads from ports or accommodations. A regular sight-seeing bus is also operated by a private transportation company from March 20 to November 20. The total usage was 2,722 persons in fiscal year 1993.

There is a forest railway which provides no passenger transportation, but which is used by the electric power company for the operation of a hydroelectric power plant and by the district forestry office as the means of logging (Kagoshima Prefectural Government, 1992, p.91).

(2) Transportation Issues

One of the problems arising from the increased access to Yakushima is that almost all of the transportation facilities are owned by tourist companies and cater to tourists, and the local inhabitants can not freely enter and exit Yakushima. *Minami Nihon Newspaper* (May 8, 1994) carried an article on the dissatisfaction of the local people with the recent traffic improvement efforts. Though tourists are certainly welcome as a means of boosting the economic development in Yakushima, transportation, especially by ship, is also important to the local inhabitants of the island. Actually, it would be difficult to maintain shipping operations throughout the whole year without the utilization by the local people. The transportation companies should consider the local utilization, since there is no means of egress from the island other than by ship or airplane.

A new route from Port Miyanoura to Port Miyazaki via Port Nishinoomote is scheduled to begin operations in April, 1995 (*Minami Nihon Newspaper*, August 12, 1994). In Miyazaki City, the seat of the Miyazaki Prefectural Government, a large new resort facility called Sea-Gaia is now under construction and was partially opened in 1993. An extensive new sight-seeing course including Miyazaki and Kagoshima Prefectures is expected to develop. The transportation capacity to Yakushima must be discussed in relation to the capacity to accommodate visitors, for example, the number of accommodations, tourist information facilities, management of tourist associations, the transportation conditions on the island, the water supply, refuse disposal, and treatment of forest lands. While problems in these areas caused by the rapid increase in the number of visitors have not yet been noted, it is

necessary for local municipal officers to consider various ways of preventing a serious impact on the local community.

There are at least two other problems with the transportation conditions on the island, one of which is the underdeveloped state of the public transportation service. Tourists must use a taxi or rental car to travel from the ports or their accommodations to the sight-seeing spots. It is necessary to increase the visitor transport capacity on the island. For example, the improvement of public bus transportation service would be useful in increasing the transportation capacity without an increase of adverse environmental influence. Recently, several sight-seeing spots throughout Yakushima have been developed and revitalized. The consequences may be far-reaching if these facilities are all opened and the number of visitors increases without any change in the transportation system on the island. Yakushima is a famous island with unique natural features, and the preservation of nature and forest resources would be a most basic tourism development policy. In this sense, the planning of the transportation system, for example, the introduction of an electric-powered bus must incorporate assessment of the environmental impact (Note 7). The utilization of the forest railway, which is presently not used for passenger transportation, is a possibility in this sense.

There is also a lack of public sight-seeing transportation service. Even though the Kagoshima Prefectural Government considers this island an eco-tourism destination, tourists who want to study the environment or the culture on Yakushima have to pay a great amount for transportation cost, by either taxi or rental car. Although there is presently a regular sight-seeing bus in operation, the usage is not high, mainly because the sight-seeing course and schedule do not appeal to all visitors. As the demands of visitors are varied, it is not possible to satisfy these demands with only one choice. Thus, many kinds of excursion bus tours in small buses are necessary. As such tours cost more than a regular sight-seeing bus tour and the number of users is not stable, private transportation companies are not interested in their development, and it may be necessary for the public sector, for example, the municipal office, to consider such development.

2. Accommodations

(1) Number and capacity

The number of accommodation facilities, rooms, and accommodation capacity on Yakushima in April 1, 1992 was 56,507, and 1,838 persons, respectively. There are 6 hotels (98 rooms, 365-person capacity), 1 public lodge (a "Kokumin-shukusha" with 30 rooms and 120-person capacity), 29 tourist homes ("Minshuku", 188 rooms and 647-person capacity) and 20 accommodations of other types (191 rooms and 706-person capacity).

The change in the number and capacity of accommodations during the period from 1980 to 1992 is shown in Table 4. The total number of accommodations showed only slight increase, from 50 to 60. During this period, the number of public lodging (including Youth Hostels) decreased, while that of tourist homes increased. There were 2 public lodges and 2 Youth Hostels on Yakushima in 1980. One Youth Hostel (16 rooms, 60-person capacity) located in Kamiyaku-cho closed in 1985, and the other located on in Yaku-cho (7 rooms, 86-person capacity) closed in 1987. A public lodge opened in 1965 in Kamiyaku-cho (46 rooms, 147-person capacity) closed on March 1, 1988. There is presently only one public accommodation (33 rooms, 133-person capacity) in Yaku-cho (opened in 1971).

The overall accommodation capacity has decreased slightly, as a result of the decrease in

Table 4. Accommodation facilities and the capacity

(type of facility, person)

Year* ¹	Number of accommodations					Capacity				
	Hotel	Public lodging* ²	Tourist home	Others	Total	Hotel	Public lodging* ²	Tourist home	Others	Total
1980	5	4	22	21	52	—	—	—	—	—
1981	5	4	23	21	53	—	—	—	—	—
1982	6	4	23	18	51	—	—	—	—	—
1983	5	4	25	21	55	338	426	609	645	2,018
1984	5	4	26	21	56	338	351	634	645	1,968
1985	7	3	27	17	54	428	291	637	454	1,810
1986	6	3	30	17	57	377	285	719	464	1,972
1987	6	2	28	16	52	435	214	712	409	1,770
1989	6	1	25	15	47	445	110	600	459	1,614
1990	5	1	24	20	50	332	110	594	711	1,747
1992	6	1	29	20	56	365	120	647	706	1,838

Source : Kagoshima Prefectural Government, Kumage Branch Office.

*¹ As of September 30 in 1989, and April 1 in 1990 and 1992. In the other years, the months of survey are not known.*² Before 1986, including Youth Hostels.

public accommodations capacity, which declined from 426 in 1983 to 120 in 1992.

(2) Accommodations considerations

The total accommodation capacity on Yakushima is less than the number of visitors to Yakushima in the peak seasons. One of the characteristics of the tourism on this island is that the number of a day-trip visitor is very small. While the high-speed ship ferries passengers from Kagoshima Main Port and Port Miyanoura in 1 hour and 45 minutes and it is therefore possible to go to Yakushima and come back on the same day, the representative sight-seeing spots are located far from Port Miyanoura, and a day trip is therefore almost impossible (Note 8). Thus, most travellers to Yakushima have to stay at some type of accommodations on the island. The present analysis clearly indicates, however, that the accommodation capacity has not increased, while the number of visitors to Yakushima has steadily increased.

To remedy this condition, several projects have been undertaken. Iwasaki Company, the largest resort company in Kagoshima Prefecture, is now constructing a 125-room resort hotel in Yaku-cho, with total floor area of 15,000 m². This hotel is scheduled for completion in the summer of 1995 (*Minami Nihon Newspaper*, January 31, 1994). New construction and reconstruction of hotels and tourist homes increased during the summer and autumn of 1993 (*Minami Nihon Newspaper*, October 5, 1993). As no data for activities after 1993 have yet been published, the present real number of accommodations is not clear, but it is clear that the number and capacity of accommodations is presently increasing. At this point, the tourism industry is becoming progressively more important to Yakushima.

However, as a result of the increased transportation and accommodation capacity in response to tourism, it will be necessary from a managerial aspect to maintain a certain level of tourism. The impact of tourism on transportation and accommodation can be resolved by an increase in the available facilities, but the impact on the forested area cannot be so easily remedied. Recent environmental suggestions include a requirement that the number of visitors

to Yakushima be limited. Tourism Association of Kamiyaku-cho opposes this view, and suggested to the Kagoshima Prefectural Government the alternative of adoption of the following four countermeasures: 1) increased security personnel and travel guidance personnel to instruct travellers in respect for nature, for the purpose of protecting Jomon-Sugi; 2) instruction in environmental etiquette, for example, regarding litter disposal; 3) preparation of signs advising mountain-climbers; and 4) regular environmental survey (*Minami Nihon Newspaper*, July 28, 1994).

The price of accommodations is also an issue. The frequency distribution of accommodations (minimum price) per person including dinner and breakfast is as follows: 2 at 3,500 yen, 7 at 4,000-4,500 yen, 12 at 5,000-5,500 yen, 23 at 6,000-6,500 yen, 10 at 7,000-9,000 yen, and 9 at 10,000 yen or over (data source: accommodation price list accompanying the tourist map of Yakushima). The price of most accommodations is within the range 5,000-7,000 yen per night, may be prohibitive, especially for young travellers, long-term lodgers, and family groups. It is necessary to provide low-priced accommodations for such users.

The age distribution of visitors to Yakushima has not been systematically surveyed. The Yakusugi Museum questionnaire results indicate that the age distribution of visitors to the museum in fiscal year 1992 was percentages 0-15 years (20.7%); 16-22 years, 15.8%; 23-29 years, 15.4%; 30-39 years, 16.8%; 40-49 years, 12.9%; 50-59 years, 9.4%; 60 years and over, 7.6%; and unknown, 1.4% (total number of responses, 3,002). More than half of the respondents were less than 30 years old. The age distribution of the visitors to Yakusugi-Land (a Yakushima Recreational Forest) who responded to Baba's questionnaire (1994) was 16-19 years (1.5%), 20-29 (26.4%), 30-39 (17.1%), 40-49 (17.9%), 50-59 (19.1%), 60 and over (13.9%), and unknown (4.0%), respectively (number of respondents, 397). About 28% of the respondents were less than 30 years old. Although no definite conclusions can be drawn from these two surveys which were directed at limited audiences, it seems that people of all age groups visited both facilities, and it is clear that the proportion of younger people was somewhat high.

Generally, Youth Hostels are a representative accommodation for younger people. There were 2 Youth Hostels on Yakushima before 1984, but both have closed. There is also only one public lodge remaining. There are presently 2 campgrounds on Yakushima, i.e., Yahazu Campsite in Kamiyaku-cho and Youth Camping Village in Yaku-cho (capacity, 200 persons). There is also another apparently nameless campsite in Yaku-cho. These campsites are open only in summer, and are located along the shore. Young people use these facilities for cost reasons, and the number of visitors during the peak seasons seems to exceed the capacity.

The development efforts which have been made since the summer of 1993 are mainly luxury accommodations (*Minami Nihon Newspaper*, October 5, 1993). Generally speaking, young people, especially mountain-climbers, do not spend money, and they are not perceived as the ideal market to be targeted by tourism industry. However, nature is a main sight-seeing resource in Yakushima, and the major tourism policy adopted by the Kagoshima Prefectural Government is the fostering of eco-tourism. Of course, it is also necessary for older people to have an opportunity to engage in eco-tourism, but the educational aspects would targeted younger people. This goal does not accord with the decline in the number and capacity of public accommodations.

3. Forest recreation

The major objective of visitors to Yakushima is mountain-climbing and visiting natural forests. Sugi over 1,000 years old known as Yaku-Sugi can be seen on the island. As there are several old trees located near forest roads, tourists can see them without engaging in strenuous mountain-climbing. The oldest tree, Jomon-Sugi, cannot be seen without walking, about four hours, in the case of the typical walking course, from Arakawa to Jomon-Sugi. Yakushima Recreational Forest is available for the purpose of viewing natural forests and is accessible by taxi or rental car. Baba et al. (1995, in press) discussed the recent conditions at Yakusugi-Land, a Yakushima Recreational Forest and reported the questionnaire responses of visitors. Their results indicated that tourists of all ages use this facility. The total number of visitors to Yakusugi-Land was 42,428 in fiscal year 1993 (Note 9). As the forest paths and bridges in this facility have undergone reconstruction recently, visitors can hike without mountain-climbing shoes.

There are no statistics regarding the number of users of forest road and paths at Yakushima National Forest. The Kagoshima Prefectural Government (1992, p.117) estimated that a minimum of 10,000 persons of all ages visit Jomon-Sugi each year. The number of users of the forest paths, like that of Yakushima visitors as a whole, is probably increasing, and several problems due to crowding have been noted in the peak seasons. For instances, the number of mountain-climbers exceeds the capacity of the shelter hut, and some must camp here and there on the forest paths. Recently, because of this situation, the introduction of a mountain-climbing control system has been discussed. Another problem is the adequate protection of Jomon-Sugi; as most of the mountain-climbers go to Jomon-Sugi, the protection of this old tree has been discussed.

Several new policies have been introduced as countermeasures to these problems. It is worth noting that there is no single comprehensive agency of the Japanese Government which is entrusted with the tourism policy, which therefore tends to lack comprehensive scope. A similar state is also found at the local level. The roster of attendees at a conference regarding the Yakushima forest area usage policy which began on July 14, 1994, is illustrative of the fragmentation of responsibility. The delegates at the conference included representatives of the following related but separate offices: Kamiyaku District Forestry Office, Shimoyaku District Forestry Office, Yakushima Ranger Office of the Environmental Agency, Kagoshima Prefectural Government (Department of Environmental Policy, Department of Tourism and Yakushima Regional Office), Yakushima Police, Kamiyaku-cho Town Office, Yaku-cho Town Office, Kamiyaku-cho Tourism Association, Yaku-cho Tourism Association, and Yakushima Environmental Foundation. The countermeasures adopted in the summer of 1994 can be roughly separated into 3 policy areas, namely, enlightenment as to environmental etiquette, strengthening the off-limits areas near Jomon-Sugi, and construction of a portable toilet facility. The environmental enlightenment policy includes patrols near Jomon-Sugi by rangers. These measures to respond to the increased tourism of the forest area were implemented in the summer of 1994.

Conclusion

The number of visitors to Yakushima has increased rapidly since 1989, mainly as a result of improvement of the transportation and access to the island. The increased concern of the

local inhabitants regarding the fate of the native forests, symbolized by the ancient tree Jomon-Sugi, is a basic feature of the background, together with the registration of the island with Conservation for the Protection of World Culture and Natural Heritage. Effective countermeasures to address the increased tourist volume have not been implemented. In 1993, the number of visitors to Yakushima decreased by around 10%, but the main cause was the aberrant climatic conditions prevailing during that year, when Kagoshima City sustained typhoon substantial damage. If Yakushima is to be developed as a sight-seeing destination, especially for eco-tourism, a new forest policy must be developed which takes into consideration the impact of tourism. The most important impediment to this goal is that there is no comprehensive agency responsible for recreational planning in relation to national forest planning. The forest utilization plan has an important role in the future of Yakushima. As the impact of tourism cannot be ignored, a new forest utilization plan must be created by the agencies responsible for the national forest in cooperation with the related administrative offices and local inhabitants.

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Notes

- 1) The two municipal bodies on Yakushima are Kamiyaku-cho in the north and Yaku-cho in the south. Kamiyaku-cho also includes a small neighboring island, Kuchinoerabu Island (total area, 38.04 Km²; population, 202; 1990 national census). Several statistics for Yaku-cho, including data given paper, also include data for Kuchinoerabu Island.
- 2) The EPA method was developed by the Economic Planning Agency, Government of Japan in 1963. Of the many versions of EPA time-series-analysis, type X-4 was used in this analysis.
- 3) The average percentage changes of TCSI, TCI, I, TC, and S are 32.10, 7.50, 6.89, 1.63, and 30.41, respectively. The related ratios I/TC, I/S, S/TC, I/TCSI, TC/TCSI, and S/TCSI are 4.22, 0.23, 18.62, 0.21, 0.05, and 0.95, respectively. Characteristically, the average percentage changes of TCSI and S are high and the value of S/TCSI is approximately 1. Thus, the seasonal adjustment is required. The average trend duration (meaning the average number of months continuous change in the same direction is observed) for TCI, TC, and I is 1.64, 4.55, and 1.55, respectively.
- 4) Yakusugi Museum was constructed in 1989 and is managed by the Yaku-cho Town Office. The total building area is 1,181 m², 526 m² of which is used for exhibition. Several facilities for tourists and researchers are presently under construction near this museum.

- 5) In the statistics for the ferryboats, a child is counted as 0.5 person.
- 6) The new ship has total tonnage of 3,500 t, sea speed of 22.0 knots, passenger capacity of 494 persons (temporary, 1,000), and car carrying capacity of 96 cars (26 cars and 17 full-size sight-seeing buses).
- 7) Electric-powered bus service has been established at Nikko National Park in Japan. At this national park, the entrance of private cars was prohibited for the purpose of the conservation of natural resources on April 1, 1993, and this bus was introduced as an alternative means of transportation (*Minami Nihon Newspaper*, May 1, 1993).
- 8) The introduction of a high-speed ship service often increases the number of day-trip travellers. The recent situation in the Yaeyama Islands, of which the main island is Ishigaki Island, in Okinawa Prefecture is a good example. A high-speed ship links Port Ishigaki with the ports of the neighboring small islands and Iriomote Island. These islands are now within one-day access zone from Ishigaki City, and there are numerous travel agencies providing many package tours and sight-seeing courses.
- 9) This figure indicates the number of persons who paid the voluntary entrance fee. This new system was introduced to improve the management of this recreational forest in April, 1993. Almost all of travellers pay this voluntary entrance fee, which is 300 yen per person. As the manager is on duty from 9:00 to 17:00, the number of visitors does not include the visitors who entered before 9:00 or after 17:00.

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