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YOSHIFUSA KITABATAKE

What Can Be Learned from Domestic and International Aspects of Japan's Forest Resource Utilization?*

ABSTRACT

Economic growth depends on increasing use of natural resources. In this paper, the impact of Japan's Post-War economic growth on Japan's use of domestic and international forest resources is reviewed. Despite increasing demand for timber, pulp and fuel, the Japanese have not exploited their domestic forests for two reasons. First, the Japanese have increased timber imports. Second, the Japanese have become concerned about protecting the non-timber values of domestic forests. However, the Japanese timber trade has had an indirect impact on the indigenous people of forest regions in Sarawak, Malaysia as a type of double-entry bookkeeping system demonstrates. Finally, Isard-Liossatos's "Weak Social Justice" (WSJ) criterion, a desirable criterion for economic development, is not met when applied to forest resource utilization both in Japan and Sarawak.

INTRODUCTION

Economic growth in post-war Japan has increased utilization of forest resources.¹ The first sections of this paper deal with the impact of Japanese economic growth on both domestic and international forest resource utilization. Special attention is paid to how the increasing demand for wood has led to an increase in timber imports with subsequent effects on the domestic forestry sector.²

*The paper was originally presented at an international colloquium on urbanization and the environment held at the University of Toronto, June 21–23, 1990, and also at several other scientific meetings including the Far-Eastern Meeting of the Econometric Society held at the Seoul National University, Korea, June 29–30, 1991. The author wishes to acknowledge valuable comments made by Professor Shuichi Nagata, Professor Joseph Whitney, and Dr. Makoto Inoue.

1. See M. Kumazaki, *Japanese Economic Development and Forestry*, in *Forest Policy in Japan* 1, 2, 6 (R. Handa ed., 1988) (reviewing the relationship between Japanese economic growth and forestry between the 1888 through 1985).

2. See T. Cox, *The North American-Japanese Timber Trade*, in *World Deforestation in the Twentieth Century* 164 (J. Richards & R. Tucker eds., 1988) (providing a good historical review of the Japanese timber trade across the Pacific); see also J. Laarman, *Export of Tropical Hardwood in the Twentieth Century*, in *World Deforestation in the Twentieth Century*, *supra*, at 147 (providing a good review of the Japanese trade of hardwoods).

In the next section, the case of large-scale forest road construction in one of Japan's national parks is described. It is used to illustrate the emerging concern among Japanese for the non-timber values of their forests as they turn to domestic forests to satisfy their demand for wood.

The third section mainly deals with the indirect impact of the Japanese timber trade on the indigenous peoples of Sarawak, Malaysia, based on an informative study made by Evelyne Hong.³ A modified double-entry bookkeeping system is used to clarify the existing institutional structure of forest utilization in Sarawak.

Chart 1 summarizes the outline of the present study. From this study, two lessons are derived. The first is presented in the second section. Keeping in mind the criticism that Japan tries to protect its own forests at the expense of Third World forest environments, Japan must implement a more rational use of its domestic forestlands. Japan must manage its timber and non-timber values of forest resources through appropriate land use control. Zoning in the national forest and national parks, for example, is especially recommended.

The second lesson, presented in section three, is that Japan must recognize that indigenous peoples in Sarawak, Malaysia, are highly dependent on the natural forests of the region, and therefore, Japan, which has become a dominant importer of tropical woods from Sarawak, must help protect the regenerative capacity of those forests.

In the final section, the two lessons are summarized in terms of Isard-Liossatos's Weak Social Justice (WSJ) criterion.⁴ The criterion is used to judge the distributive effect of forest resource utilization policies in Japan and Sarawak, Malaysia.

JAPAN'S POST-WAR ECONOMIC GROWTH AND FOREST RESOURCE UTILIZATION

Rising Demand for Housing Construction and Timber Supply

After World War II, the demand for new housing in Japan increased.⁵ The resulting rise in housing construction lead to an increase in demand for timber.⁶ Because of the limited supply of timber available from domestic forests, timber prices started rising in Japan.⁷

3. E. Hong, *Natives of Sarawak* (1987).

4. W. Isard and P. Liossatos, *Social Injustice and Optimal Space-Time Development* 1 *Journal of Peace Science* 69, 72 (1973).

5. R. Handa, *Timber Economy and Forest Policy After the World War II*, in *Forest Policy in Japan*, *supra* note 1, at 22, 23.

6. *Id.* at 23.

7. *Id.*

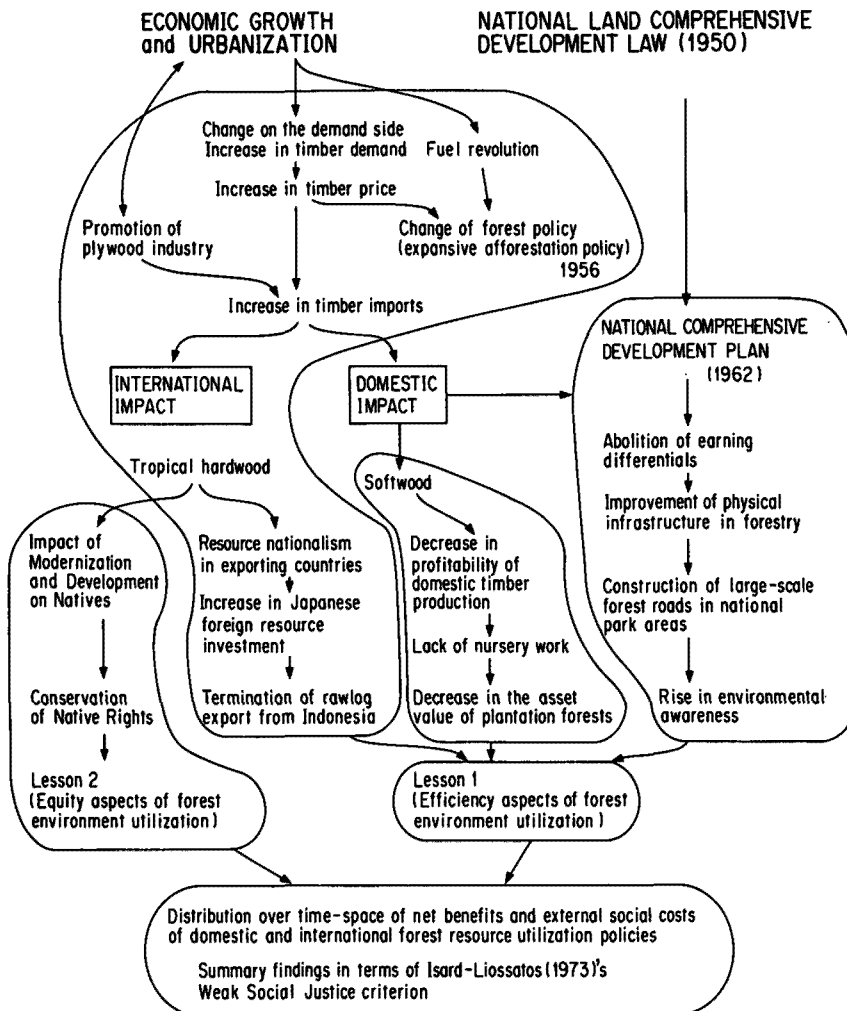


CHART 1. Outline of the Present Study

Besides the increase in housing construction, another significant change occurred in demand for wood during the 1950s.⁸ Petrochemical fuels almost completely replaced fuelwood for domestic cooking and heating needs.⁹ Thus, broad leaved species which would have been cut for fuelwood were allowed to grow.

The lumber price index exhibited far greater variation from 1952 through 1961 than the general price level did.¹⁰ During this time domestic forest owners were the dominant suppliers of lumber products.¹¹ The Forestry Agency of Japan was faced with consumer demand as well as strong pressure from politicians to increase the domestic production of lumber. The Agency departed from its traditional management policy of harvesting the sustainable timber yield and adopted a new policy, called 'Kakudai-zourin' (expansive afforestation), in 1956.¹² Under Kakudai-zourin, public subsidies were to be used to encourage domestic forest owners to plant rapid-growing coniferous timber species, such as 'sugi,' 'hinoki,' and 'karamatsu,' on a large scale after forest owners harvested broad-leaved species.¹³

Meanwhile, wood imports steadily increased as shown in Figure 1.¹⁴ The ratio of imports to total supply increased dramatically during the 1960s from 12.3 percent in 1960 to 55 percent in 1970.¹⁵ One significant factor driving demand for imported timber was the change in housing constructing technology.¹⁶ The traditional way of constructing houses had been construction on demand, where an individual carpenter collected the necessary building materials to meet individual needs.¹⁷ Faced with a rising housing demand, especially in large urban areas, large building trade companies, such as subsidiaries of railroad companies with large land holdings, began building houses for installment sale. Consequently, the

8. Kumazaki, *supra* note 1, at 11. "By 1960, a fundamental change had already begun in... wood consumption pattern. Various substitute goods for timber had started to be used on a large scale. The consumption of firewood and charcoal . . . has decreased remarkably since then." *Id.*

9. Cox correctly pinpoints that the fuel revolution reduced the commercial value of most Japanese broad-leaved species. See Cox, *supra* note 2, at 171.

10. H. Akai, *Policy for the Stabilization of the Supply, Demand and Price of Timber*, in *Forest Policy in Japan*, *supra* note 1, at 379, 387.

11. *Id.* at 386.

12. See T. Iguchi, *Afforestation Policies of the Post World War II Period*, in *Forest Policy in Japan*, *supra* note 1, at 67, 71; see also T. Kurimura, *Management Plan and Accounting System of the National Forests in Forest Policy in Japan*, *supra* note 1, at 197, 201-2 (discussing how the traditional management policy of harvesting the sustainable timber yield was modified to meet a new policy of expansive afforestation).

13. Iguchi, *supra* note 12, at 71; see also Y. Ouchi, *Development of the Forest Plan System*, in *Forest Policy in Japan*, *supra* note 1, at 44, 44-45.

14. Rinya-Koseikai, *Nihon Ringyou Nenkan* vols. 8-40 (1957-1989).

15. See *id.*, vol. 13, at 67 (1962); *id.* vol. 23, at 35 (1972).

16. F. Nakagawa, *Mokuzai Ryouutuu To Wa* 132-33 (1984).

17. *Id.* at 132.

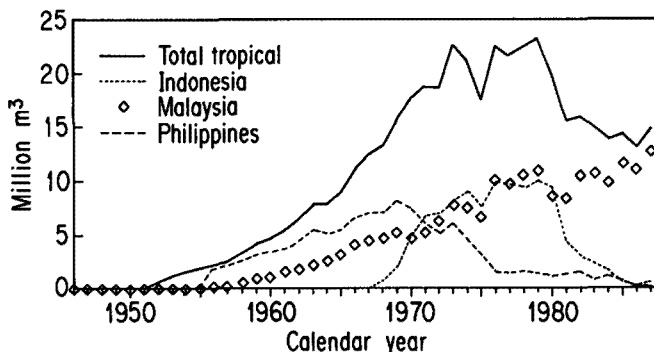


FIGURE 1. Trends of Timber Importation in Japan

Data Source: Rinya Kosai-Kai, *Nihon Ringyou Nenkan*, volumes 8 through 40 (1957 edition through 1989 edition)

demand for large quantities of standardized logs increased.¹⁸ Since Japan's jumbled terrain has restricted significant increases in economies of scale¹⁹ from taking place in sawmill and logging operations, this change in housing construction technology enhanced the comparative advantage of foreign suppliers.²⁰ Thus, "by 1972 over 50 percent of the softwood timber being used in Japan was coming from abroad—most from the west coast of North America, but a considerable quantity also from Soviet Siberia."²¹

The post-War Japanese economy suffered from a chronic trade deficit until the latter half of the 1960s.²² Thus, during the 1950s and 1960s, various kinds of government policies were implemented to promote exports and restrain imports.²³ Under the "Foreign Exchange and Foreign Trade Control Law"²⁴ and the "Law Concerning Foreign Currency,"²⁵ the import of raw materials was restricted to those that would ultimately contribute to the promotion of exports.²⁶ Backed by this policy, the plywood industry began importing tropical hardwood (lauan logs) from the Philip-

18. *Id.* at 133–34.

19. Cox, *supra* note 2, at 173. Economies of scale is characterized by the decrease in unit production cost with a higher volume of output.

20. Nakagawa, *supra* note 16, at 133.

21. Cox, *supra* note 2, at 165.

22. K. Uno, *Japanese Industrial Performance* 341 (1987).

23. *Id.* at 345, 371.

24. Foreign Exchange and Foreign Trade Control Law, Law No. 228 (1949).

25. Law Concerning Foreign Currency, Law No. 163 (1950)

26. See T. Pepper et al., *The Competition* 74 (1985). Without mentioning these two laws, the authors stress that "[t]he government was able to influence industrial development in the early postwar years through an elaborate system of laws and regulations governing foreign trade and international financial transactions."

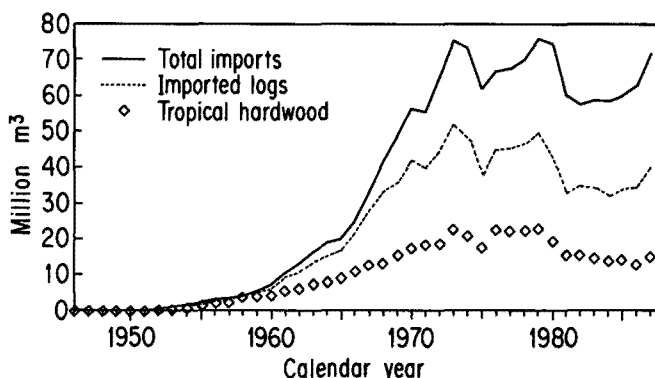


FIGURE 2. Japanese Imports of Tropical Hardwoods

Data Source: Rinya Kosai-Kai, *Nihon Ringyou Nenkan*, volumes 8 through 40 (1957 edition through 1989 edition)

pinus in 1951 and exporting most of the plywood it produced to the United States.²⁷ By the mid-1960s, Japanese-made plywood dominated the United States market.²⁸ But as other nations, such as the Philippines, Korea, and Taiwan become competitive, Japanese plywood processors shifted away from export markets to domestic markets.²⁹ Japanese demand for plywood was growing because of the change in housing construction technology in Japan.³⁰

As shown in Figure 2, most tropical hardwood imported during the 1950s and the 1960s came from the Philippines and Malaysia.³¹ In 1969, the year in which Japanese imports from the Philippines were the greatest, 88 percent of the total exports of the Philippines went to Japan.³²

In the Philippines, the 1946 Constitution, established after independence, "provided that all timberlands belonged to the state."³³ However, during the post-independence era and the 1950s, almost no governmental restraints existed on timber cutting in the Philippines.³⁴ In the 1960s, the Philippines Forestry Bureau started intervening in timber cutting operations by preferentially awarding timber licenses to "applicants who would set up processing plants."³⁵ In July 1967, the Philippine

27. Y. Murashima, *Development of the Timber Industry and Timber Trade*, in *Forest Policy in Japan*, *supra* note 1, at 391, 395.

28. Y. Murashima, *Mokkuzai Yunyu To Nihon Keizai* 18 (1974); see also Cox, *supra* note 2, at 183-84.

29. *Id.* at 13.

30. Nakagawa, *supra* note 16, at 138-39.

31. This assertion is based on data taken from *Nihon Ringyou Nenkan* *supra* note 14; see also F. Nectoux and Y. Kuroda, *Timber From the South Seas* 35 (1989).

32. *Nihon Mokuzai Yunyu-Kyoukai* [Japan Lumber Importers Association], *Nijyunen No Ayumi* 210 (1970).

33. E. Boado, *Incentive Policies and Forest Use in the Philippines*, in *Public Policies and the Misuse of Forest Resources* 165, 173 (R. Repetto & M. Gillis eds., 1988).

34. *Id.* at 173.

35. *Id.* at 175.

government instituted a new law which, in principle, prohibited timber producers from exporting more than 60 percent of produced logs in raw log form, thus requiring them to process at least 40 percent of the logs prior to export.³⁶ This policy of promoting domestic wood processing industries was strengthened from 1968.³⁷ For example, the share of hardwood plywood imported from the Philippines among total United States imports of hardwood plywood increased from 11 percent in 1960 to 16 percent in 1968.³⁸

Faced with increasing resource nationalism in the Philippines and elsewhere, the Japanese greatly increased forest resource investment abroad after 1968.³⁹ The Japanese had made only one foreign forest resource investment before 1960, and that was made in Alaska in 1953.⁴⁰ The number of investments had increased to seven during the period of 1963–1967.⁴¹ From 1968 to 1971, the number of foreign forest resource investments more than tripled to 25.⁴² Twelve investments were made to import tropical hardwood logs mainly from Indonesia, which still allowed raw log exports.⁴³ Thirteen investments were for importing processed woods, such as lumber, plywood, pulp, and chips from Southeast Asia, Alaska, Africa, and elsewhere in the world.⁴⁴

Backed by these resource investment projects in Indonesia, log imports from Indonesia began to increase at the end of 1960s.⁴⁵ However, in April 1979, the Indonesian government, like the Philippine government, established new policies to promote domestic wood processing industries and proceeded to implement them.⁴⁶ In 1982, the Indonesian government announced its intention to terminate raw log exports by 1985⁴⁷ and actually terminated raw log exports in 1985.⁴⁸ Due to these policies, Japanese imports of raw logs from Indonesia have decreased drastically since 1980, and Japanese imports of processed wood from Indonesia have steadily increased.⁴⁹ For example, the ratio of plywood imports to domestic plywood production in Japan increased significantly from 0.9 percent in 1978 to 21 percent in 1987.⁵⁰ Recent Japanese imports of tropical

36. Murashima, *supra* note 28, at 108.

37. *Id.* at 108–9.

38. *Id.* at 18.

39. *Id.* at 48.

40. *Id.*

41. Murashima, *supra* note 28, at 48.

42. *Id.*

43. *Id.* at 48, 51.

44. *Id.*

45. *Id.* at 113.

46. A. Araya, *Wagakuni no Nanyozai-Jyuyo to Santi no Doukou*, *Ringyo Keizai* 24, 28 (1988).

47. *Id.* at 28.

48. *Id.* at 26.

49. *Id.* at 25–26.

50. *Id.* at 25.

**TABLE 1. Price Variations^a of Hinoki Log with Different Grading Rules
(Observed Data in the Matuzaka Market, Mie Prefecture^b)**

Grading Rule	1961	1969	1976
Itto	35,000	72,000	130,000
Small knot	41,000	90,000	200,000
Very small knot	50,000	120,000	400,000
No knot on one side	56,000	150,000	550,000
No knot on two sides	63,000	300,000	800,000
No knot on three sides	77,000	400,000	1,300,000
No knot on all sides	86,000	450,000	1,500,000

a. In yen.

b. Source: Tutomu Hayami, *Genzai no Ringyo ni okeru Owase-Ringyou no Taiou no Sikata*, *Fukuokaken Ringyou-Keieisha Kyokai Kaiho*, No. 207 at 5 (1983).

hardwood have come from Malaysia, more specifically from Sarawak and Sabah.

Impact on Domestic Forestry

As a result of heavy investment in foreign timber, the domestic forest industry in Japan has been depressed. Moreover, Japanese are increasingly concerned about protecting their own forests. A good summary of the impact of timber imports on domestic forestry in Japan was made by Cox.⁵¹ Price trends for hinoki,⁵² a representative Japanese softwood species, are shown in Table 1. These data were recorded by Tsutomu Hayami, a leading timber producer in Mie Prefecture, who compared the intra-price variations of 3 m long hinoki logs with different grading rules in 1961, 1969, and 1976.⁵³ As imports of foreign logs increased, the price difference between the higher grade domestic logs and lower grade domestic logs grew larger. This direct relationship between log imports and price differences corresponds to the situation in which imported logs are substituted for lower grade logs making lower grade domestic logs unmarketable; however, the demand for domestic logs of higher quality continued for specialty uses, such as for 'tokonoma' (alcoves) in Japanese houses.⁵⁴

51. Cox, *supra* note 2.

52. Hinoki (*Chamaecyparis obtusa*) is "[a]n evergreen tree up to 30m high with a straight trunk 1m rarely up to 1.5 m in diameter." See S. Kurata, 1 Illustrated Important Forest Trees of Japan 44 (1971).

53. T. Hayami, *Genzai no Ringyou ni okeru Owase-Ringyou no Taiou no Sikata*, *Fukuokaken Ringyou Keieisha Kyokai Kaiho* No. 207, at 1, 5 (1983).

54. *Id.* at 6-7 (discussing tending techniques to produce high quality timber such as wood without knots). See T. Fujimori, *Development in Silvicultural Techniques after World War II*, in *Forest Policy in Japan*, *supra* note 1, at 347, 351.

Both forest ownership patterns and forest owner attitudes are affected by the price situation. Forest ownership in Japan has long been highly fragmented in many small parcels held by individual foresters.⁵⁵ This fact was the sole reason why forest owners were not the targets of land reform.⁵⁶ To the Japanese forestland owner: "Forests represented a secondary, or supplemental, source of income . . . [M]any looked on their timberlands as a treasure box to be tapped at a time of special need . . . rather than as a resource to be managed for maximum long-run return."⁵⁷ This kind of forestry practice might be acceptable if one's forest is composed of mixed hardwood, formerly used primarily for charcoal production, and receives little silvicultural nursery treatments. However, industrial wood, for example, for plywood production, is most efficiently used produced in large monocultural plantations that are even-aged. Forest plantations require intensive silvicultural management, including clearing under growth and thinning at regular intervals to maximize timber production. Tsuru⁵⁸ calculates, based on survey data taken in Kumamoto Prefecture, an internal rate of return for harvesting 'sugi'⁵⁹ on a hectare (ha) of land to be about two percent. With this low rate of return, no private forest owners with small holdings are willing to invest in thinning and other efforts.⁶⁰

Conflict with Nature Conservationism

In 1956, the new Japanese policy of expansive afforestation mentioned earlier was implemented to increase domestic production of industrial wood. Several years later in 1961 the Ikeda Cabinet introduced the National Income Doubling Plan and the Japanese economy entered its famous period of accelerated economic growth.⁶¹ Against this background, the government established the National Comprehensive Development Plan in 1962.⁶² This plan had been long-awaited since the establishment of the Resources Committee in 1947.⁶³ The Resources Committee was created by the Occupation Army GHQ, with a clear understanding of the Japanese situation then that "while both Japanese science and Japanese technology are based on European and American founda-

55. Cox, *supra* note 2, at 169.

56. H. Schenck, *Natural Resources Problems in Japan*, 108 Sci. 372 (1948).

57. Cox, *supra* note 2, at 170.

58. S. Tsuru, *Kyuushuu Tiiki ni okeru Ringyou Saisansei to Kasseika*, 67 Chouki Kinyuu 12, 23 (1987).

59. Sugi (*Cryptomeria japonica*) is "[a] huge evergreen tree up to 40m high with a straight trunk up to 2m or more in diameter." See Kurata, *supra* note 52, at 42.

60. See Tsuru, *supra* note 58, at 23. To increase the return to forest investment, Tsuru recommends governmental programs to improve foresters' access to forest road and to increase public subsidy to replantation and thinning activities. *Id.* at 25-28.

61. A. Shimokobe, *Thirty Years Experience in Development Planning*, in *Nation-Building and Regional Development* 137, 142 (H. Nagamine ed., 1981).

62. *Id.* at 142.

63. *Id.* at 139, 142.

tions, the liaison between them has been poor. . . . Gen. MacArthur has stressed the need for a centralized agency to coordinate national planning programs in the interests of Nippon's natural resources."⁶⁴

With industrial prosperity starting in the 1950s, "investments in basic industries, such as heavy industries, chemical industries, and power plants, were directed to large equipment and thereby became long-term."⁶⁵ Rural regions including mountain villages were facing an accelerating loss of population to urban regions in the 1950s.⁶⁶ Under these circumstances, the government initiated a program aimed at abolishing earning differentials between agriculture and industry.⁶⁷

The government's main strategy in forestry consisted of improving the physical infrastructure of forestry production.⁶⁸ The conflicts with nature conservation movements which arose were mainly related to the construction of roads on public forest lands. Most public timber lands, especially national forests, were located in relatively inaccessible, mountainous areas including areas zoned as 'natural' parks. Thus, a policy of raising productivity through the construction of large-scale forest roads in these areas was undertaken beginning in the mid-60s, where "[t]hese roads covered development areas of more than 10,000 ha with a woodland of more than 85 percent. The starting point and terminus of the roads were connected to public roads such as national road or prefectural road."⁶⁹

National parks and natural parks in Japan are designated under the Natural Parks Law of 1957.⁷⁰ Natural parks are based upon 'zoning' of both privately and publicly owned land.

[T]his zoning system was established in 1931 when the National Parks Law, the law preceding the Natural Parks Law, was first enacted. At that time there was some controversy over whether to adopt a state owner system modeled after the United States or to introduce a zoning system as in European countries. The government selected a zoning system in consideration of the Japanese land ownership situation, and applied the principle of "restriction of land owners' rights for the sake of public use" based on German law."⁷¹

64. Schenck, *supra* note 56, at 371.

65. T. Yogo, *A Course of Events in the Development of Japanese Agriculture*, in *Nation-Building and Regional Development*, *supra* note 61, at 175, 214.

66. *Id.* at 215.

67. *Id.* at 216.

68. See M. Kawamura, *Development of Forest Road Policy and Administrative Measures*, in *Forest Policy in Japan*, *supra* note 1, at 94, 102-3.

69. *Id.* at 104.

70. Natural Parks Law, Law No. 161 (1957).

71. S. Nishioka, *Socio-Economic Analysis of National Park Regions*, in 91 Research Report from the National Institute for Environmental Studies, Japan 95, 98 (1986).

Though the government can restrict landowners property rights,⁷² Article 3 of the Natural Parks Law requires the state to respect the proprietary rights, mining rights and other property rights of private forest owners. The law also requires that mediation between land development and other public interests be taken into consideration.⁷³ Generally, the management of national parks in Japan consists of 1) preparation of a park scheme in consultation with the prefectural governments and the related governmental agencies, 2) project review and establishment of a permit system, 3) provision of facilities so as to increase park use, and 4) guidance services for users.

The construction of a large-scale multipurpose forest road (the Minami Alps Forest Road, MAFR) in the Minami Alps National Park illustrates the conflict with conservationists over the new policy.⁷⁴ This national park was established in 1964 and consists of about 35,783 ha of land located in western Yamanashi Prefecture and eastern Nagano Prefecture.⁷⁵ Fifty percent of the land belongs to the prefectures, 39.4 percent of the land is national forest lands, and the remaining 10.5 percent is privately owned.⁷⁶ Based on the Natural Parks Law, the park scheme for any national park classifies the total park lands into four categories of "special protection areas" and three classes of "special areas."⁷⁷ These special area classes are class I special area, class II special area, and class III special area. These land use categories correspond generally to the three main land use categories in the "biosphere reserve concept" proposed by UNESCO (United Nations Educational, Scientific and Cultural Organization).⁷⁸

72. *Id.* at 98.

73. Natural Parks Law, *supra* 70, art. 3:

74. Nishioka, *supra* note 71, at 98.

75. Y. Kitabatake, *Economic Analysis of a Large-Scale Multipurpose Forest Road in Minami Alps National Park*, in 91 Research Report from the National Institute for Environmental Studies, *supra* note 71, at 119 [hereinafter *Economic Analysis*].

76. *Id.*

77. Natural Parks Law, *supra* 70, arts. 17-18.

78. As to the biosphere reserve concept developed by UNESCO's MAB program, see M. Batisse, *Developing and Focusing the Biosphere Reserve Concept*, 22 Nat. & Resources 2 (1986). The biosphere reserve concept aims at achieving a desirable pattern over physical space of the interaction between human settlements and the environment. Recognizing that pressure points arising from environmental utilization in particular areas can be summarized as conflicts arising from the role of development and the role of conservation and as a lack of exchange of information of interregional significance, a UNESCO and UNEP joint special task force convened in 1974 and defined the three multiple functions of biosphere reserves as a development role, a conservation role, and a logistic role. To implement the multiple function concepts in each area, the task force proposed a simple generalized zoning pattern for biosphere reserve, which combines a core area to ensure the conservation role, a buffer zone to especially ensure its logistic role, and a transition area to accommodate the development role. Generally, 'special protection areas and class I special areas' correspond to the core areas in the biosphere reserve classification, 'class II special areas' to buffer zones, and 'class III special areas' to transition areas. In the Minami Alps National Park, half of the park land is classified as a 'class III special area' where ordinary forestry activities as well as public works projects are permitted.

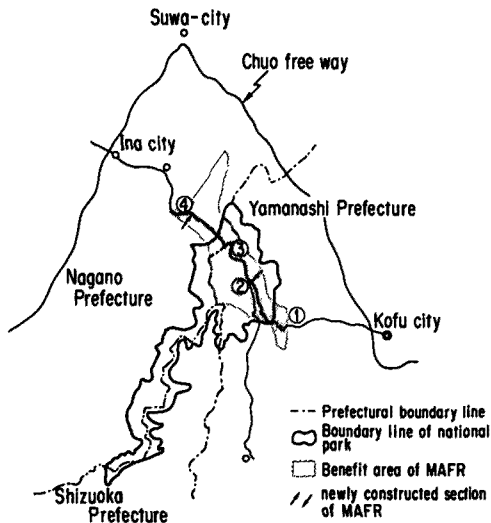


FIGURE 3. Location of Minami Alps National Park

Source: Reproduced with slight modification from Figure 1 in Y. Kitabake, *Economic Analysis of a Large-Scale Multipurpose Forest Road in Minami Alps National Park*, in 91 Research Report From the National Institute for Environmental Studies, Japan, 121.

In June 1968, the Japan Forest Development Corporation (JFDC) applied to the Ministry of Welfare for a permit to build a large-scale multipurpose forest road (MAFR) across the Minami Alps National Park.⁷⁹ In December of the same year, the head of the National Park Division of the Ministry of Welfare approved the application with the condition that the JFDC should present a detailed construction plan for the area that was designated as a class I special area, before the construction of that section would be undertaken. The approved road construction project consisted of two parts: improvement of the existing forest road and construction of a new road. The newly constructed part is indicated in Figure 3 by two arrowheads.

In June 1974, the JFDC applied for a permit to build a road across the area designated as a class I special area of the Minami Alps National Park to the Environment Agency and presented a detailed construction plan.⁸⁰ The Environment Agency had been established in 1971 and the National Park Division had been transferred from the Ministry of Welfare to the Environment Agency as the Nature Conservation Bureau.⁸¹ JFDC's

79. R. Nakajima, *Special Forestry Road in Minami Alps National Park*, 360 Kokuritu Kouen 16, 17 (1979).

80. *Id.* at 17.

81. *Economic Analysis*, *supra* note 75, at 120.

application soon attracted national attention and several conservation groups strongly opposed the construction of that section of the road, whereas the majority of local residents supported the construction. Rising concern for environmental conservation was a worldwide phenomenon as evidenced by the 1973 Stockholm Conference on the Human Environment. However, there was one significant domestic factor that contributed to the opposition. This was the adverse reaction of the people to the Japan Archipelago Remodelling Plan—a complementary plan to the National Comprehensive Development Plan to improve regional urban centers.

Shimokobe explains the background to this story as follows:

With the National Comprehensive Development Plan, then, it was our idea to establish the foundations for major projects throughout Japan—projects such as a nationwide Shinkansen (bullet train) system, large-scale industrial complexes . . . One more important goal in our approach to this new organization was . . . to see if regional cities could be equipped and instilled with the capacity to function as urban centers on their own, without relying on metropolitan centers such as Tokyo and Osaka. We meant to pursue this in specific and concrete terms through the reduction of time/distance factors, and improvements in the service levels of traffic in the outlying regions.”⁸²

This idea of revitalizing regional autonomy by large-scale investment projects “was well received at the time, and provided much thoughtful discussion.”⁸³ Especially, Mr. Kakuei Tanaka carried the banner of his ‘Japan Archipelago Remodelling Plan’ as the keynote theme of his policy when he assumed the office of Prime Minister in 1972.⁸⁴ Shimokobe states further that:

However, it was at this time that Japan’s excess liquidity, brought about a favorable trend in its international balance of payments, was unfortunately linked in the minds of many people to large-scale speculative cornering of the land market. There was an upsurge in criticism which claimed that the root of all evil was the land problem, and that the major instruments of these misdoings was the ‘Japan Archipelago Remodelling Plan.’ This coincided furthermore with major escalations in public opposition to environmental pollution. . . . Sharp criticism extended to our New National Comprehensive Development, highly praised at the

82. Shimokobe, *supra* note 61, at 144.

83. *Id.*

84. *Id.* at 144–45.

time it had been announced, and we were suddenly caught in the midst of a raging storm of adverse public opinion and social controversy.⁸⁵

In recognizing the importance of the conservation groups opposition to the construction of the Minami Alps Forest Road (MAFR) the Director General of the Environment Agency asked the Nature Conservation Council to comment on the issue in December 1974.⁸⁶ The Nature Conservation Council is the principal advisory organ to the Environment Agency's Director General in the field of nature conservation.⁸⁷ The debate in the Nature Conservation Council continued for more than three years.⁸⁸

In April 1978, the Nature Conservation Council presented its report to the Director General of the Environment Agency.⁸⁹ In the report, the following options were expressed: 1) if the MAFR's construction plan had not been presented 10 years ago but at the time of the report, the general opinion of the council members would be negative to the approval of the construction plan; 2) in recognizing the fact that 97 percent of the total length (56.5 km) of the road had already been built, the Council could not reach a unanimous opinion; 3) one opinion favored construction with the condition that nature conservation measures be strengthened in order to prevent possible damage to the natural environment after the opening of the MAFR; 4) another opinion opposed the construction of the remaining portion of the MAFR because the benefit from completing the MAFR was expected to be much less compared to the expected damage to the natural value of the forest.⁹⁰ Four months later, in August of 1978, the Director General of the Environment Agency accepted the opinion favoring the construction and approved the completion of the MAFR with several conditions. In particular, private automobiles were prohibited during the recreational season on the newly constructed portion of the MAFR.

Based on a rough estimate of the costs and benefits of the MAFR, in which the net revenue received from various MAFR-related activities did not increase after construction, the completion of the MAFR appears to have jeopardized the total asset value of the Minami Alps National Park. The total area which has benefited from the MAFR as shown in Figure 3 consists of 21,700 ha.⁹¹ The benefit area lying within the Minami Alps National Park is 12,900 ha, 83 percent of which consists of Yamanashi Prefectural Forest (YPF), with the remainder being national forest.⁹² The

85. *Id.* at 145.

86. Nakajima, *supra* note 79, at 17.

87. See Nature Conservation Law, Law No. 85. art. 13 (1972).

88. Nakajima, *supra* note 79, at 17.

89. *Id.*

90. Economic Analysis, *supra* note 75, at 123.

91. *Id.*

92. *Id.*

MAFR was analyzed in terms of data related to the benefit area (YPF). The balance of the benefit area lies in Nagano Prefecture, but was excluded for reasons related to the construction history of the MAFR. The 2-4 portion of MAFR in Figure 3 was constructed beginning in 1968. The 1-2 portion, called the Norogawa Forest Road (NFR), was constructed between 1952 and 1961. Through analyses of only the benefit area in Yamanashi Prefecture, the added economic net benefit of the MAFR over the NFR can be determined. Figure 4 (a) shows the time series data (real value, 1980 average) for the revenues of forest-related activities and the construction and maintenance costs of both the NFR and the MAFR. The erosion control revenue is equal to the public expenditure on erosion control by the Forestry Agency, and the recreation revenue is calculated to be the number of visitors multiplied by average consumption expenditures. Both sets of revenue data are plotted for each year since 1956. The stagnant recreation revenue is due in part to the bad public image incurred by the completion of the MAFR.⁹³ The cost data in Figure 4 (a) reflects the construction of the NFR for the period 1956 through 1961 and construction of the MAFR for the period 1969 through 1980. The high cost in 1982 is due to repairing damage to the MAFR caused by a typhoon. Figure 4 (b) shows the net revenue data stated in real terms. These data derive from Figure 4 (a) and show that the maximum annual net revenue over the 31-year period was attained in 1967, when construction of the MAFR began.

Lesson 1—Multiple-Use Forestry and Biosphere Reserve Concept

The need for more rational forest land use is eminent for four reasons:

- 1) raw log imports from tropical countries are decreasing and imports of processed timber are increasing;
- 2) about 10 million ha of plantation forest characterized by monocultural plantings now exist in Japan, most of which need tending, including weeding, removal of vines, improve-

93. This view is likely to be reduced from our study on Japanese 'national trust' movements. Two representative 'national trust' movements in Japan, 'Shiretoko National Park 100 Square Meters' movement in Shari Town of Hokkaido region and 'Tenjinsaki Citizen Land Owners' movement in Tanabe City of Wakayama Prefecture were taken as illustrative cases to investigate factors affecting people's willingness to pay to conserve nature. In these movements, the general public has been asked to donate money (8000 yen in the Shiretoko case and more than 1000 yen in the Tenjinsaki case) to purchase private lands for nature conservation. One dollar is equal to 144.8 yen (annual average 1990). The analysis of random sample questionnaires sent to donors of these two movements as well as a historical study on nature conservation movements in Japan conclude that: 1) This kind of citizen participation movement can be recognized as new waves in the nature conservation history in Japan; 2) The desire to preserve precious nature left in Japan and the apprehensions of losing nature in living environment are found to be two dominant factors in driving people to donate. See S. Nishioka & Y. Kitabatake, *National Trust Movement in Japanese Nature Conservation*, in 90 Research Report From the National Institute for Environmental Studies, Japan [hereinafter *National Trust Movement*].

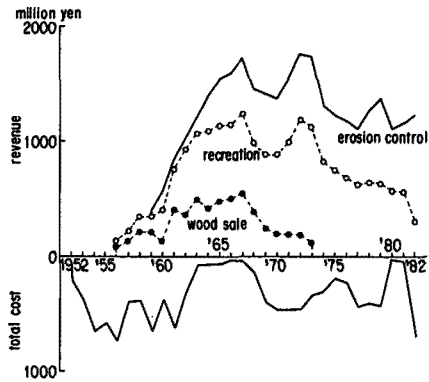


FIGURE 4a. Revenue and Cost Data (real value)

Source: Reproduced from Figure 5 in Y. Kitabatake, *Economic Analysis of a Large-Scale Multipurpose Forest Road in Minami Alps National Park*, in 91 Research Report from the National Institute for Environmental Studies, Japan, 125.

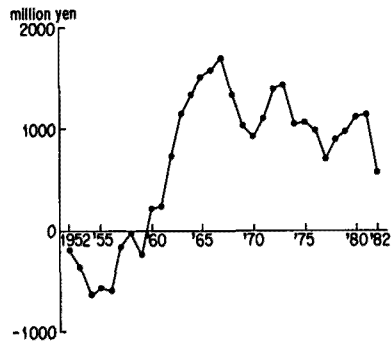


FIGURE 4b. Net Revenue Data (real value)

Source: Reproduced from Figure 6 in Y. Kitabatake, *Economic Analysis of a Large-Scale Multipurpose Forest Road in Minami Alps National Park*, in 91 Research Report from the National Institute for Environmental Studies, Japan, 125.

ment cutting, thinning, and pruning for greater commercial value;⁹⁴

- 3) the adequate maintenance of plantation forestry is difficult because of a) economic competition from imported wood products, b) institutional arrangements characterized by fragmented forests as well as sawmill ownership, and c) physical constraints, including a climate which favors growth of bush and weeds, and rugged terrain which makes replanting after harvest difficult and expensive;
- 4) drawing environmental concern as well as public awareness of the importance of environmental diversity in forests (as shown by the recent halt of a large-scale forest road construction in a national forest in Akita and Aomori Prefectures, where large areas of old-growth beech forest exist).⁹⁵

The author believes that it is useful to combine the economic theory of multiple-use forestry and the 'biosphere reserve' concept developed by UNESCO-MAB. The latter concept clearly recognizes the multiple functions of biosphere reserves by creating a core area, a buffer zone area and a transition area. Human use of the forest is permitted while the ecosystem is protected.⁹⁶ Figure 5 shows logging areas in the Minami Alps National Park. Most of the logging accompanied the construction of the MAFR. The designated classes of the park scheme are indicated S (special protection area) and three classes of special areas. The special areas include class I special areas, which are mostly special denuded lands in this case; class II special areas; and class III special areas where wood production occurred.

Public awareness of the importance of environmental diversity (both for commodity and noncommodity values) in forests is developing. The current park scheme, in which the three land use types of core areas, buffer zones, and transition areas coexist in a somewhat disorganized way, does not properly take into account people's preferences for environmental quality. Our study on Japanese "national trust" movements⁹⁷ included detailed questionnaire analyses of people who donated funds to two representative movements. The results show that the public's awareness of nature conservation is, among other things, closely related to the progress of urbanization. The participation rate (the number of donors/total population) is much higher in large urban regions. Further, the number of donors who are concerned with nonuse values of nature preservation is relatively large in large urban regions. Thus, enhancement of

94. Iguchi, *supra* note 12, at 82.

95. The meaning of 'rational' here is well described by Bowes and Krutilla: "The economic multiple-use management problem is the selection of a sequence of management actions so as to maximize the discounted value of net benefits from the flow of harvests and other resource services over time." M. Bowes & J. Krutilla, *Multiple Use Management* 91 (1989).

96. See Batisse, *supra* note 78, at 1-2.

97. See Nishioka & Kitabatake, *supra* note 93.

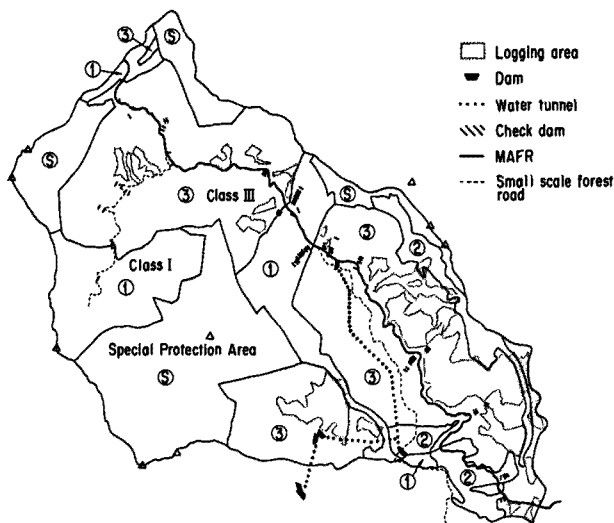


FIGURE 5. State of Forest Utilization and Land Use Classification in 1980

Source: Reproduced with modification from Figure 9 in Y. Kitabatake, *Economic Analysis of a Large-Scale Multipurpose Forest Road in Minami Alps National Park*, in 91 Research Report from the National Institute for Environmental Studies, Japan, 132.

effective forest resource utilization through appropriate park scheme design would enhance opportunities for nature related activities in parks rather than destroy them. Both urban residents and residents of the surrounding rural areas would benefit. This is one important lesson we may learn from domestic aspects of Japanese forest resource utilization in the post-war era.⁹⁸

EQUITY ASPECTS OF FOREST ENVIRONMENT UTILIZATION

Laarman's Comment on Japanese Tropical Log Imports

Japan currently imports and has been importing roughly half of the world's volume of traded tropical hardwoods. As noted at the end of the next section, most tropical log imports to Japan now come from Sarawak and Sabah, Malaysia. Laarman refers to a popular argument:

98. The Japanese Forestry Agency has applied the biosphere reserve concept to the zoning of selected parts of the National Forest including the one on the Akita-Aomori Prefectural border.

Some analysts would hold that Japan's current forest and trade policies are responsible for a large part of export-related deforestation in the tropics. Japan would seem to be holding back its own reserves of timber, shifting timber cutting (and its environmental consequences) to where wood can be supplied more cheaply.⁹⁹

Japanese have substituted imported timber for low-grade domestic logs, implying that the price Japanese have paid for imported timber may have been lower than the price they have paid for local low-grade logs.¹⁰⁰ On the other hand, whether Japan's forest and trade policies are responsible for deforestation in the tropics has not been resolved in Japan. In this respect, Laarman's response to the question of whether or not Japan has a moral responsibility for deforestation in the tropics is an impartial one. He states that

My argument is that we have not yet developed enough of an analytical framework to lay blame on one trade flow or another as being the more destructive to tropical forests. . . . A useful beginning to establish the necessary evaluative framework is to inventory the tropical forest types and regions of the world most at risk, reckoning moral and political responsibility when imports of tropical woods can be traced to extractions from those particular forests.¹⁰¹

Nevertheless, students of welfare economics (one of the moral disciplines) must be aware of the equity aspect of forest environment utilization. Nectoux and Kuroda, for example, argue that: "The impact of the Japanese timber trade on the environment, and on the indigenous peoples of forest regions in Southeast Asia, has been largely negative."¹⁰²

HISTORY OF FOREST ENVIRONMENT UTILIZATION IN SARAWAK, MALAYSIA¹⁰³

Japan has been importing a large quantity of tropical hardwood from Sarawak, Malaysia. This region of Malaysia has suffered substantial deforestation recently.¹⁰⁴ After a century of colonial rule by the British adventurer, James Brooke, and his descendants, Sarawak became a British

99. Laarman, *supra* note 2, at 160-61.

100. See Kumazaki, *supra* note 1, at 12; Akai, *supra* note 10, at 390.

101. Laarman, *supra* note 2, at 161.

102. Nectoux & Kuroda, *supra* note 31, at 5.

103. For an informative study on the socio-economic-institutional effects of forest resource utilization, especially, those of changes in land laws in Sarawak, Malaysia, see E. Hong, *supra* note 3. The argument in this section derives from her book.

104. See Nectoux & Kuroda, *supra* note 31, at 18, 30.

Colony in 1946.¹⁰⁵ In 1963 Sarawak gained independence from the British and became part of the Malaysian Federation.¹⁰⁶ Until the 1950s, the indigenous land tenure systems in Sarawak were regulated primarily by the native customary law called "adat."¹⁰⁷

'Adat' constitutes the main institutional framework regulating the use of environment in traditional swidden society. Under adat, the community as a group controls and regulates the tenure and rights to forest use among its members.¹⁰⁸ The rights to use the environment in swidden society are allocated by the customary law called 'adat.'¹⁰⁹ The basic social and economic unit is the family which occupies a room within a longhouse, in which members of the community reside.¹¹⁰ Under adat, any family can attain rights to use land simply by clearing the forest. Rights to land can also be passed on to the descendants, provided that they do not leave their natal longhouse.¹¹¹ Members of the longhouse community "possessed rights for the use not only of all cultivated plots but also the surrounding forest to the extent of half a day's journey from the longhouse, as well as all the water running through this area."¹¹² These rights to the use of environment under adat represent the main features of environmental capital for an individual Dayak community.

Table 2 summarizes, in terms of a modified double-entry book-keeping system called "environment-economic accounting system,"¹¹³ the economic life of the traditional Dayak swidden society described in Hong's study.¹¹⁴ 'Environmental assets' are defined as those physical, technological, and managerial means which are closely related to human utilization of environment and which are not necessarily subject to economic valuation.¹¹⁵ 'Environmental liabilities' are defined as those constraints which are traditionally, customarily and legally imposed upon the use of environmental assets by the economic entity in question.¹¹⁶ 'Environmental capital' may be defined as the capability of the economic entity in question to use environmental assets under present and future economic and technical conditions based on present institutional conditions.¹¹⁷

105. Hong, *supra* note 3, at 38.

106. *Id.*

107. *Id.* at 2, 14, 37.

108. *Id.* at 38.

109. *Id.* at 14, 38.

110. Hong, *supra* note 3, at 11.

111. *Id.* at 14.

112. *Id.* at 15.

113. Y. Kitabatake, *An Environment-Economic Accounting System*, University of Tsukuba, Institute of Socio-Economic Planning Discussion Paper Series at 429 (1990).

114. Hong, *supra* note 3, at 11-36.

115. Kitabatake, *supra* note 113, at 6.

116. *Id.*

117. *Id.* at 7.

TABLE 2. Environmental Accounting for a Traditional Swidden Society in Sarawak (before World War II)

(a) Environmental Balance Sheet	
Environmental Assets	Environmental Liabilities
Land Forests Water	<p>Adat Law</p> <p><i>Land Tenure and Rights</i></p> <p>Adat "provided and entitled anyone who cultivated the land with rights to the use of land," where</p> <ul style="list-style-type: none"> • "priority to the right to cleared jungle land was vested in the heirs of the original feller" • "No individual may hold more land than he can use" <p><i>Mutual Aid and Sharing</i></p> <ul style="list-style-type: none"> • In shortfall years any household with surplus rice is to assist any other household that is in need. • sharing excess animal catch which remained to an individual family need <p>Environmental Capital for Swidden farmer</p> <ul style="list-style-type: none"> • Cultivated lands • "the surrounding forest to the extent of half a day's journey from the residential site, as well as all the water running through this area"
(b) Statement of Physical Input/Output	
<p>Average family (5.7 members)</p> <ul style="list-style-type: none"> • Swidden Farm, 4.5 acres • Simple tools such as lift nets, traps, spears 	<p><i>Rice</i></p> <p>Average yield for a family 4,268.8 kgs (greater than the average subsistence of 2820 kgs)</p> <p><i>Other Food Resources</i></p> <ul style="list-style-type: none"> • Provision of important source of protein through consumption of venison and wild pig (90kgs) • Raw materials for life and protection: firewood, weaning materials, soaps and medicine, weapon and trap preparation, construction materials <p><i>Commercial Crop to raise cash</i></p> <p>rattan and vines illipe nuts (once every 2 years)</p>

The statement of physical input and output in Table 2 describes in physical terms the input and output sides of human use of the environment.¹¹⁸ The physical statement is converted, after valuation in the market place or through some other institutional valuation process, to a statement of revenues and expenses.¹¹⁹ Table 2 (b) describes for an average individ-

118. *Id.*

119. *Id.*

ual family, the statement of physical input and output. Four and one-half acres of swidden farm cultivated by a family of 5.7 members produces enough rice to meet the requirements of the family. The forests contiguous to a family's longhouse also provide other food resources, raw materials for life and production, and cash crops. The statement of revenues and expenses is not provided here because the market economy characterized by the exchange of commodities via currency does not play an important role in traditional Dayak society.

Under the rule of the Brooke family,¹²⁰ the official land policy was one of noninterference in the native customary law of adat.¹²¹ Thus, in 1863 when the first land law was promulgated, it limited the creation of governmental rights and proprietorship to land outside the natives' existing domain.¹²²

After World War II, a significant change in land laws was made by the British Colonial Government.¹²³ In 1958 the government instituted the Land Code. Implementation of a large-scale rural development plan was consistent with the Colony's first Five-Year Development Plan.¹²⁴ All land in the state was classified into five categories under the Land Code: 1) Mixed Zone Land, on which anyone could hold title to this category of land; 2) Native Area Land, which could be held by natives. Land could be categorized as Native Area Land by the government by giving notice of the proposed classification to the public in the Gazette; 3) Native Customary Land, which was land in which native customary rights persisted, and which could be extinguished when the government declared by public notice in the Gazette; 4) Interior Area Land, which lay in the deep interior and could not be held under title, but on which native customary rights could be created subject to the permit; and 5) Reserved Land, which was reserved for public purposes and included forest reserves and national parks.¹²⁵

Under the 1958 Land Code, all land in Sarawak belonged to the government and natives had to make applications for governmental permits to enjoy customary rights to land tenure.¹²⁶ Where the 1958 Land Code was aimed at restricting native customary rights to land, the prior Forest Ordinance of 1953 was aimed at curtailing shifting cultivation and customary rights to nearby forests.¹²⁷ The 1953 Ordinance had divided the forests of Sarawak into two main categories of permanent forests (over

120. In 1841, James Brook became the First White Rajah of Sarawak. He and his descendants ruled Sarawak until World War II. See R. Pringle, *Rajahs and Rebels* 2, 70 (1970).

121. Hong, *supra* note 3, at 39.

122. *Id.* at 39, 40.

123. *Id.* at 44.

124. *Id.* at 46.

125. *Id.* at 47-53.

126. Hong, *supra* note 3, at 80.

127. *Id.* at 75.

which the government had full control) and stateland forests.¹²⁸ The natives' freedom to exercise customary rights was limited to a part of the permanent forests.¹²⁹ However, logging activities on both permanent forests and stateland forests were allowed only under permit or licence.¹³⁰ Both the 1953 Forest Ordinance and the 1958 Land Code were amended in 1979. "These amendments have been shown to be very similar in nature and reflect the primary objective of the State towards native customary tenure and shifting agriculture, which is to restrict its practice and eventually to seek its demise."¹³¹

Table 3 summarizes the current institutional structure of forest use in Sarawak, Malaysia. Under the current institutional framework, the economic life of the traditional Dayak swidden society has been constrained, as the timber industry's access to the timber in the forest has greatly increased. Although the population growth data in the region are unavailable at least to the author, if we assume that the size of the population has not changed greatly, the observed current increase in the area of annual deforestation (Table 3) may represent the indigenous swidden people's response to the depletion of environmental capital.¹³²

Lesson 2—Buffer Zone Role of Forest for Indigenous Peoples

The core area in the forest environment for natives are swidden farms, where the main cereals are taken, while the forest surrounding native communities acts as a buffer zone, providing other food resources, cash crops, and raw materials for production activities. The timber trade between Japan and exporting countries, such as Malaysia, is contributing to an inequitable distribution of external costs to indigenous peoples in the forest regions from which timber is exported. This is Lesson 2. Whether specific land development policies in Sarawak, Malaysia, including the policy of regrouping natives and their traditional longhouse communities into model agricultural villages, are right or wrong are questions

128. *Id.* at 73.

129. *Id.* at 74–75

130. *Id.* at 75.

131. Hong, *supra* note 3, at 79.

132. The concept of environmental capital can be clarified from the viewpoint of the functional theory of resources stressing that the concept of environmental resource is purely functional, inseparable from human wants and human capabilities. Man at a given cultural stage and place first recognizes what particular opportunities a given physical environment such as a forest environment can offer to satisfy human wants. We may redefine these recognized physical opportunities as 'environmental assets.' By applying man-made institutional structures (environmental liabilities) and physical structures to environmental assets, man can transform the recognized physical opportunities to environmental capital (environmental resources) capable of generating different types of environmental services such as the supply of timber and nontimber products (food, fuel, fiber, wildlife medical herbs, etc.). See Y. Kitabatake, *On the Use of an Environmental-Economic Accounting System* (Nov. 1991) (unpublished manuscript, on file with author). For the functional theory of resources, see H. Hunker, *Introduction To World Resources* 7–14 (1964).

which can only be resolved by many people of Sarawak. But, if we agree that each person should be able to choose his or her own lifestyle, unless that choice impairs the welfare of the general public, we must pay special attention to the fact that where the benefits and costs of any act are evaluated by the utility and disutility of each individual affected by the act, an inequitable distribution of benefits and costs caused by the adoption of any specific policy will result. The effect of land development policy in Sarawak provides such an example.¹³³ The timber industry in 1983 "accounted for 15.5 percent of the GDP, second only to the mining sector."¹³⁴ Portions of these timber benefits flow to the government and to industries which employ about 30,000 persons.¹³⁵ However, Table 3 and Hong¹³⁶ indicate, that significant cost burdens in terms of disutilities are borne by a large number of the indigenous swidden farmers who comprise 25 percent of the Sarawak population.¹³⁷ The land development policy which promotes development of the forest for the export market and does not protect the buffer zone of forest around agricultural villages "has disrupted the lives and livelihood of the natives who live in the forest interior."¹³⁸

SUMMARY IN TERMS OF ISARD-LIOSSATOS'S CRITERION

Isard and Liossatos proposed as a desirable criterion for economic development the "Weak Social Justice" criterion (WSJ).¹³⁹ According to the WSJ, the net benefits of economic development, such as the consumption of goods, should increase over time, and the external costs, such as pollution, should decrease over time in a more equitable way.¹⁴⁰ Figure 6 illustrates a desirable distribution pattern over the social space of a forest resource utilization policy (FRUP).¹⁴¹ The social space axis was constructed by distributing the population in a region along a scale from most to least per capita income.¹⁴² Net benefit (NB) curves represent a market-evaluated net benefit in terms of income generated as a result of the forest

133. There is a similar case of an inequitable distribution of benefits and costs caused by mercury pollution (Minamata disease). See Y. Kitabatake, *Japan*, in *Sustainable Cities* 281, 292-93 (R. Stren et al. eds., 1992).

134. Hong, *supra* note 3, at 143.

135. *Id.* at 143-44.

136. *Id.* at 38-167.

137. *Id.* at 145.

138. *Id.* at 144.

139. Isard & Liossatos, *supra* note 4, at 72.

140. *Id.*

141. Kitabatake illustrates a similar pattern for the case of industrial development with pollution. See Y. Kitabatake, *Social Injustice and Optimal Space-Time Development* 42 (1974) (unpublished Ph.D. dissertation, Cornell University).

142. *Id.* at 27.

TABLE 3. Utilization of Environmental Resources in Sarawak (Present)
Environmental Balance Sheet

Environmental Assets		Environmental Liabilities
Total Land Area	123,253 km²	The 1958 Land Code (amended in 1979)
Land area according to land tenure categories (as of 1985)	% of total	
Mixed Zone Land	7.927	The government may declare any area of land to be in this category by notification in the Gazette
Native Area Land	7.394	This land may be held by natives under title and can be created by the government by notification in the Gazette
Native Customary Right and Interior Area Land	68.979	Land in which native customary rights prevail prior to the 1958 Code and the land in the deep interior. The government can create or dispose of the land by notification in the Gazette
Reserve Land	15.704	Reserved for public purposes. The Government can create the land by notification in the Gazette
Total Forest Area	95,232 km²	Forest Ordinance 1953 (amended in 1979)
Category of Forest Area (as of 1984)	% of total	
Permanent Forest	34	
Forest Reserves (8,479 km ²)		A permanent source of timber and other produce, where natives are not allowed to exercise customary rights and where a license is issued for logging activities
Protected Forests (24,286 km ²)		Native's customary tenure are allowed under the government's permission, where logging activities are also allowed under permit
Communal Forest (56 km ²)		An area to serve for a settled community
Stateland Forests (including 6 national parks)	66	Logging is allowed under license, and the government can convert any part of Stateland Forests to Permanent Forest
Environmental Capital		
For timber Industry	Forest area under logging licence in 1984: 95,232 km ² (60% of total forest area) 28,217 km ² were logged in the period 1963-1985 An annual logged area in 1985 was 2,700 km ²	
For people living on shifting cultivation (Swiddeners) ^a	(230,000 persons in 1979, 20% of the population) annual deforestation: 600 km ² for the period 1966-1976 800 km ² for the period 1976-1980	

a. Annual deforestation data for swiddeners are taken from Malcollm Gillis, Malaysia, in Public Policies and the Misuse of Forest Resources 115, 145 (Robert Repetto and Malcolm Gillis, eds., 1988)

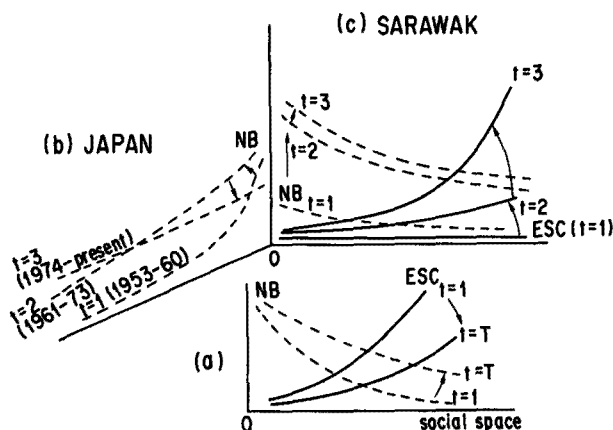


FIGURE 6. Distribution of the Market-Evaluated Net Benefits and External Social Costs over Social Space over Time (for an illustrative purpose only)

resource utilization policy (FRUP).¹⁴³ External social cost (ESC) curves represent the cost of external diseconomies, such as the loss of the forest as the source of livelihood for indigenous people. Since net benefit (NB) increases and external social cost (ESC) decreases over time in an equitable way, the distribution patterns in Figure 6 (a) conform to the WSJ criterion.

Given the Isard-Liassatos theory of weak social justice, Figure 6 summarizes a lesson (Lesson 1) we learn from the domestic impact of Japan's forest resource utilization, where the distribution of population on the basis of per capita income and population employment category (forestry and non-forestry sector) is represented along the social axis.¹⁴⁴ From the initial period of 1953–60, when the domestic forestry sector was the major supplier of industrial wood for Japan, to the second period of 1961–73, the net benefit (NB) of Japan's forest utilization policy increased in a more equitable way. The main beneficiaries were urban dwellers in the nonforestry sector who needed housing. However, from 1961–73 to the third period (1974–present), the net benefit (NB) did not increase at every space point (every level of per capita income). In particular, the number of profitable domestic forest owners decreased due to the dominance of imported timber in the domestic timber market. Furthermore, we cannot definitely say that the net benefit (NB) enjoyed by urban dwellers increased because the *in situ* value of Japanese domestic forest environments, which urban dwellers value, may have been damaged as a result of increased logging in parks to supply urban needs.

143. Market-evaluated net benefit can be computed by deducting the market cost of the intermediate goods and services used in the production activities from the market value of gross production. See J. Nautiyal, *Forest Economics* 21, 507–11 (1988).

144. For illustrative purposes only, people employed in the forestry sector are assumed to be in the highest per capita income category.

The international effect of Japan's forest resources utilization policies is illustrated in Figure 6. In Figure 6, the likely distributive patterns of forest-related net benefit (NB) and external social cost (ESC) are illustrated for the case of Sarawak, Malaysia, where the population is ordered along a scale of decreasing per capita income (social space). Three time periods are classified in terms of the degree of conflicts between the forestry industry and indigenous swidden communities. The initial period corresponds to the time when both the land code and forest ordinance had not yet been instituted. The second period corresponds to the period after their adoption in the 1950s. The third period corresponds to the time in which the depletion of forest resources in Sarawak had become apparent and the conflicts between the timber industry sector and indigenous groups in Sarawak worsened.¹⁴⁵

From the initial period to the second period, the net benefit (NB) of the forest resource utilization policy (FRUP) increased, while external social cost (ESC) also may have increased, but to a lesser extent. From the second to the third period, the increase in net benefit (NB) is observed over every level of per capita income (social space point), because employment in the forestry sector as well as in the agriculture sector increased. At the same time, however, the external social costs (ESC) may have increased greatly for the indigenous population sector in Sarawak mainly because of the damage to the productive capacity of the forest environment as a source of livelihood. As to the popular argument regarding Japan's responsibility for deforestation in the tropics, we may conclude that Japan has a partial responsibility based on the fact that continued large-scale tropical imports from, for example, Sarawak, Malaysia, has accelerated the speed of forest resource depletion in the tropics. Various institutional factors including the existing land and forest laws have favored use of forest resources in Sarawak for export. We cannot say however, how much of the responsibility should be laid on Japan, until we collect quantitative information for the factors in Figure 6.

In sum, we can conclude that the WSJ criterion applied to the forest resource utilization in Japan and Sarawak, Malaysia, is not satisfied, especially in the recent time period. Monetary and nonmonetary benefits generated by forest resource use are not being distributed more equitably as time progresses. To discover a set of effective policy variables in satisfying the WSJ criterion in the field of domestic and international forest resource utilization is the next task to be pursued. Three major policy variables should be considered: land use policy, international trade policy, and development aid policy.

145. Based on his informative field study on the socio-economic structures of various villages in East Kalimantan, Inoue expressed his personal opinion to the author, that the state of affairs in East Kalimantan was still in the second period mainly due to low population density and a long distance between the deep forest areas and the coast. See also M. Inoue & A. Lahjie, *Dynamics of Swidden Agriculture in East Kalimantan*, 12 *Agroforestry Sys.* 269 (1990).