

## **PROMOTING SUSTAINABLE AGRICULTURE AND RURAL DEVELOPMENT**

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## Summary

Since the beginning of the 1990s the Japanese national government, along with local governments and agriculturally related organizations have strived for realization of sustainable agriculture and rural development. In this chapter, characteristics of sustainable agriculture in Japan, and results of sustainable agriculture as promoted by all levels of government and various organizations, as well as feedback and problems were examined based on transition from and characteristics of previous agriculture in Japan. Characteristics of sustainable agriculture in Japan emphasize the relationship between agricultural production and the natural environment utilizing environmentally friendly agricultural technology. Strong interest is put on conservation oriented agriculture which is only a part of sustainable agriculture. It centers on agricultural technologies, supply and production of safe food, increased organic manure and less agrichemical use, damage by continuous cropping, maintenance of soil fertility, conservation of the environmental and protection of water resources. At present Japanese agriculture is supported by a preponderance of part-time farm households and aging and female farmers. However, in the future it will be supported by management entities strongly motivated toward agricultural management including business farm households, agricultural production corporations, and community farming with centralization of management and a corporate status. Japan should strive to establish sustainable agriculture economically, socially, and culturally from a comprehensive viewpoint rather than from narrowly-defined sustainable conservation oriented agriculture. Laws and systems concerning food, agriculture, and rural villages in Japan were improved from 1999 to 2005 and these measures have been promoted strongly. The importance of sustainable agriculture and sustainable development of rural villages has become apparent across the national and positive results are expected.

## 1. Introduction

Various issues as symbolized by environment pollution have emerged with the advancement and rationalization of agricultural mechanization and increased chemical use in industrialized countries of the world. In western countries since the 1980s it has been asserted that the main emphasis in agriculture should be shifted from the pursuit of

productivity, increased income, and degree of cost control to environmental concerns. Doing so requires agriculture which meets the long term needs of producers and consumers simultaneously utilizing resources for producing food and fabric without destruction of the environment. This is called sustainable agriculture and the definition is generally concerned with decreasing permanent natural destruction, maintaining agricultural productivity, being economically viable, and keeping a high quality of rural life. Particularly in Japan, viability of sustainable agriculture has been sought since the late 1980s. A wide range of methods such as follows has been attempted: low use of chemical and organic fertilizers, low use of agrichemicals, and rotation farming.

At the 1992 United Nations Conference on Environment and Development (Earth Summit), the action planning, “Agenda 21” was adopted aiming at sustainable human enterprise in harmony with the environment. Based on this, the Japanese national government, together with local governments and agricultural related organizations has strived for realization of sustainable agriculture and rural development. Basic Law for Food, Agriculture, and Rural Areas was enacted in July 1997. Based on this law, enforcement of the policy for promotion of organized, sustainable agriculture and rural development was adopted. Consumers across the nation are now strongly interested in acquiring safe food and environmental conservation. It is essential to advance preparation toward construction of a new agricultural system since healthy Japanese agriculture must be maintained. This paper will examine the following matters on the basis of transition and characteristics of previous Japanese agriculture: background of sustainable agriculture in Japan, its characteristics, details of sustainable agriculture promoted by government and organizations, and feedback and problems.

## 2. Modernization of Agriculture and its Problems

### 2.1. Overview of Japanese Agriculture

As of 2000 the total cultivated acreage in Japan was 4,830,000 ha. This amounts to 13.1% of the entire Japanese land mass. Housing sites and roads account for 8% of the land. The rest of the land is covered by wooded mountainous and hilly terrain. 54.7% of cultivated land was rice paddies and irrigated rice was the most important crop. Around 1960 half of the total production of agriculture was from rice, however, this amount had decreased to 25.4% by 2000. Contrary to this, vegetable and stock farm products as part of the total agriculture production increased to 23.2 % and 26.9% respectively (Table 1).

Indices	1960	1980	2000
Total cultivated land (1000ha)	607.1 (100.0)	546.1 (100.0)	483.0 (100.0)
Paddy field	338.1 (55.7)	305.5 (55.9)	264.1 (54.7)
Dry field (including orchard and fodder field)	269.0 (44.3)	240.6 (44.1)	218.9 (45.3)

Total number of farm households	6,056,630 (100.0)	4,661,384 (100.0)	3,120,215 (100.0)
Number of full-time farm households	2,078,124 (34.3)	623,133 (13.4)	426,355 (13.7)
Number of part-time farm households	3,978,506 (65.7)	4,038,251 (86.6)	1,910,554 (61.2)
Farm income exceeding non-farm income	2,036,330 (33.6)	1,002,262 (21.5)	349,685 (11.2)
Non-farm income exceeding farm income	1,942,176 (32.1)	3,035,989 (65.1)	1,560,869 (50.0)
Non-commercial farm households	—	—	783,306 (25.1)
Total farm household income (1000yen)	449.0 (100.0)	5,593.8 (100.0)	8,279.8 (100.0)
Net farm income	225.2 (50.2)	952.3 (17.0)	1,084.2 (13.1)
Non-farm income	184.3 (41.0)	3,562.9 (63.7)	4,974.6 (60.1)
Pension, presents, etc.	39.5 (8.8)	1,078.6 (19.3)	2,221.0 (26.8)
Average members of a farm household	5.72	4.40	3.98
Members mainly engaged in farming	2.08	1.07	1.12
Average size of holding (ha)	0.99	1.18	1.79
Total agricultural output (100 million yen)	19,148 (100.0)	102,625 (100.0)	91,295 (100.0)
Rice	9,074 (47.3)	30,781 (30.0)	23,210 (25.4)
Grains other than rice, pulses, potatoes and sweet potatoes	2,237 (11.7)	4,744 (4.6)	4,689 (5.1)
Vegetables	1,741 (9.1)	19,037 (18.6)	21,139 (23.2)
Fruits and nuts	1,154 (6.0)	6,916 (6.7)	8,107 (8.9)
Flowers	87 (0.5)	1,719 (1.7)	4,466 (4.9)
Industrial crops	819 (4.3)	4,946 (4.8)	3,391 (3.7)
Livestock and its products	3,477 (18.2)	32,187 (31.4)	24,596 (26.9)
Other crops and agricultural products	559 (2.9)	2,295 (2.2)	1,697 (1.9)

( ) %

Sources: Agricultural Census, Statistics of Agricultural Output, Report of Statistical Survey on Farm Management and Economy

Table 1: Overview of Japanese agriculture

As of 2000 the number of farm households was 3,120,000, which is 51.5% of the number in 1960. 25.1 % of the farm households, 783 thousand, either have operating cultivated land less than 0.3 ha or are noncommercial farm households which earn less than 500 thousand yen a year from farm produce. The rest, 2,337,000, are commercial farm households. The average acreage of land under cultivation is only 1.79 ha. Practically speaking, it is impossible for farmers to subsist on such a small plots; therefore, they strongly depend on non-agricultural income. According to the Farm Management Statistical Survey performed by the Ministry of Agriculture, Forestry and Fisheries in 2000, the national average number of family members in each commercial farm household was 3.98, and of these members only 1.12 were engaged in farming.

The average annual income was 8.28 million yen. Agricultural income accounted for only 13.1% of it with the remainder coming from non-agricultural work and pensions. The recent trend of pension income increasing reflects the aging of the population and it accounted for 26.8% of the total farm household income in 2000.

Cultivated land in Japan decreased by 20% over the 40 years from 1960 to 2000 and the number of farm households and farming population decreased by more than 60%. The self-sufficiency rate of edible crops in Japan has decreased year after year due to the decline of agriculture nationwide and has spurred the recent increase of imported farm produce. In 1970 the self-sufficiency rate of grain was 46%, vegetables 99%, and meat 89%; however by 2004 they had decreased to 28%, 82%, and 52% respectively.

## **2.2. Traditional Agricultural System in Japan**

Traditional agriculture in Japan was characterized as self-sufficient, small farm management with family labor centering on rice paddy cultivation. Until the 1950s the bulk of agriculture was done by traditional labor and was land intensive without machinery. Productivity of rice paddy cultivation in Japan, with its hot and humid weather, is higher than that of field cropping in western countries. This was one of the reasons which made it possible for many people to live in such a small country. In addition, paddy agriculture has several sustainable features. Firstly, the level of soil fertility doesn't degrade very quickly. In summer the flooded fields inhibit the diffusion of oxygen to the subsurface lowering the redox potential. Under such condition, degradation of soil organic matter proceeds slowly, unlike an oxic field environment, helping to retain soil fertility. Secondly, the pH of the soil is nearly neutralized by the accumulation of ferrous iron ( $\text{Fe}^{2+}$ ) from the reduction of ferric iron ( $\text{Fe}^{3+}$ ). Phosphoric acid combines with the ferrous iron creating nutrition for plant life. Lastly, a considerable amount of mineral nutrition is directly supplied by irrigation water.

Paddy rice grown in the above mentioned paddy field is an excellent crop. The rice is easy to cook, delicious, and rich in nutrients. It is the only cereal grain which can be grown utilizing basin irrigation. The productivity is high and stable. Paddy rice can sustain unlimited continuous cropping since harmful microorganism and nematodes diminish under water and toxic substances are washed away.

Traditional Japanese agriculture was ecologically sustainable centering on the growing of paddy rice combined with upland cropping and forest farming. Over time it evolved into diversified family run farming. The definition of diversified farming here is that various crops and livestock are grown or raised at the same time and are combined systematically. This was the most practical agricultural management style which optimized the use of land and people in Japan, which lies at the northern edge of the Asian Monsoon Zone with hot and humid weather in summer. Many rural villages were closely knit deriving cohesion from communal aspects such as joint forest land, pasture, crop irrigation, or coastal fishing ground. Residents gave close attention to their resources and the environment.

Paddy fields and other fields belonging to villages and farm households in the Abukuma Highlands stretched continuously on the elevated penneplains at altitudes between 400

and 700 m above sea level and spread arborescently on the alluvial plains along rivers and streams. Small farm households succeeded by utilizing the combination of paddy fields, fields, and forested mountains. They grew paddy rice and field crops such as wheat, coarse cereal, and pulse crops as well as silk cultivation, horse raising and charcoal making. They produced green manure for paddy and dry fields by collecting deciduous leaves in the mountains. Such diversified farming made the best use of various land resources and had strong self-sufficient characteristics. Moreover, it combined low-productive stock-holding agriculture with the collecting and processing of mountain resources.

Paddy farming villages, where land resources are relatively scarce, had many characteristics similar to traditional upland rural villages. On the Toyama plain, where agricultural work was restricted due to heavy snowfall in winter, they grew wheat, coarse cereal, tuber crops, and pulse crops. Astragalus was grown as green manure during the off-season instead of paddy rice. For example, around 1950 the land use rate on the Kurobe alluvial fan in Toyama prefecture was 159%. Tulip bulbs, vegetable, tobacco, watermelons were cultivated until the 1960s in addition to paddy rice cropping. Swine, poultry, and dairy husbandry were also attempted. Moreover, in the period when agricultural work was minimal, farmers did construction work as day workers. They made the best use of their farmland and workforce year-round and to make a living. As an alternative to fuelwood, branches and deciduous leaves were used. Astragalus was tilled under and human waste was used for manure. In order to maintain agriculture and rural villages, it was essential to work together on the maintenance of irrigation facilities and agricultural roads.

As stated above, traditional Japanese rural villages consisted of a residential area, kitchen gardens, fields, paddy fields, and forests. These elements maintained a distinct balance interacting with one another centering on their residents (Figure 1). Limited land resources were utilized to their fullest and maximum productivity was attempted in each village. Resources were also maintained on a community basis and utilized efficiently for stable use. Communal principles were for group coexistence rather than personal gain. The traditional rural village was surely sustainable from an ecological point of view; however, its economic level was very low and it contained irrational elements with its traditional agricultural production system and social and cultural dependence on family relations; therefore, it is not necessarily the case that the traditional rural village is sustainable.

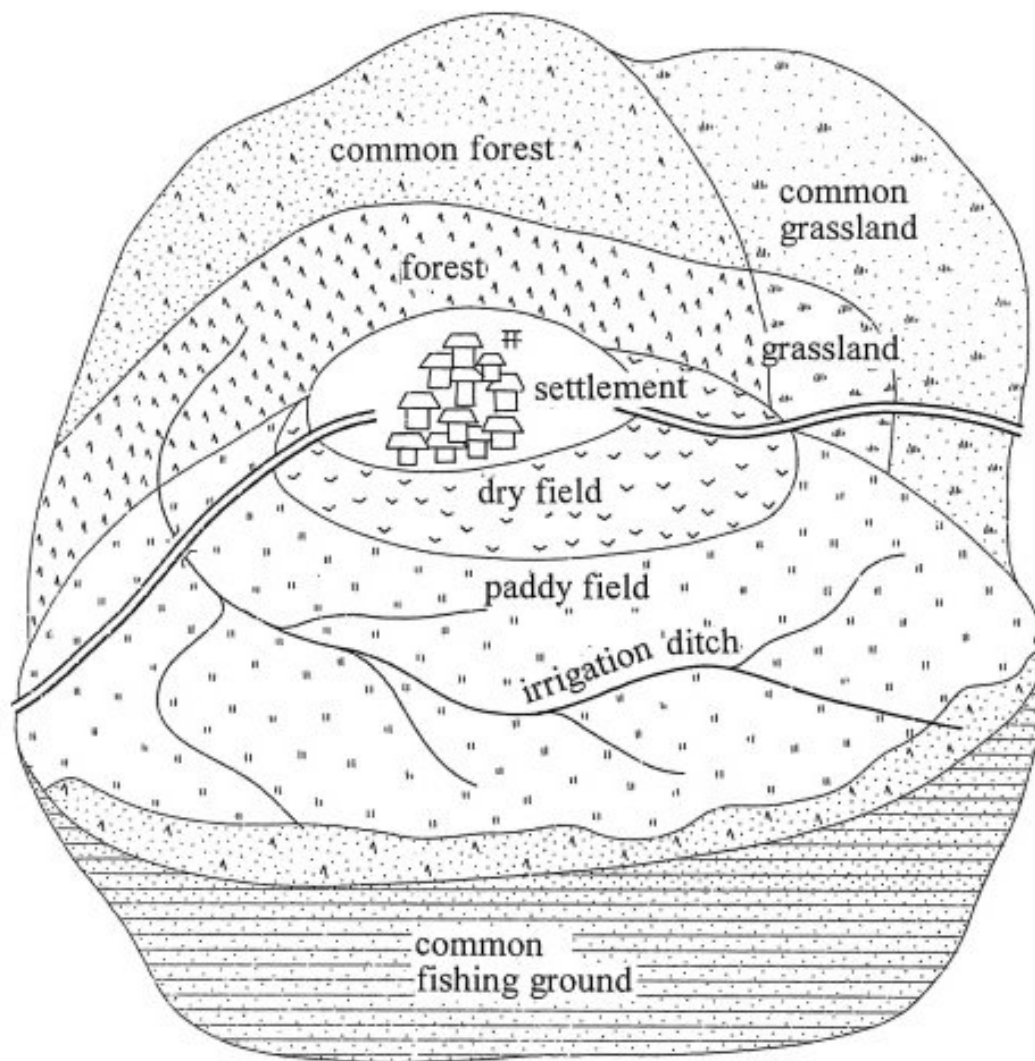


Figure 1: Land use pattern of traditional rural village in Japan

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