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The Implications of Population Control on China's Environmental Problems: Population, Environment, and Food

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1. CHINA'S POPULATION HITS THE 1.2 BILLION MARK: ESTIMATE FOR THE FUTURE

As of February 15, 1995, the population of Mainland China reached 1.2 billion, according to a joint announcement by the Chinese Planned Parenthood Committee and the State Statistics Bureau of China. China's population thus came to account for 22% of the world population of 5.8 billion.

In this paper I will examine the impact this colossal population will have on the environment and food situation in the coming century.

As of the end of 1995, the population of Mainland China reached 1,211,210,000, indicating that it had grown by 12,710,000 in a single year. The increment, it is true, was smaller than the 1970 annual peak of 23,210,000 and the 1978 figure of 17,930,000, but nevertheless it signified the addition of a population exceeding that of Tokyo.

As shown by Table 1 and Figure 1, the Chinese population expanded by an annual average of 14,555,000 from a starting point of 541,670,000 in 1949, reaching the figure of 1,211,210,000 at the end of 1995.

The National Planned Parenthood Committee claims that, thanks to the implementation of family planning beginning in the 1970s (1973), the Chinese population increment was held to 300 million less than it would have been without the programs, meaning that the 1.2 billion mark was reached nine years later than anticipated. The committee argued that the Chinese population would have reached the 1.2 billion mark by 1986 without the family planning policy. In a tone of self-appreciation, the committee emphasized that the deliberately delayed attainment of the 1.2 billion mark contributed toward alleviating contradictions between population and China's socio-economic development, as well as toward delaying the time when the world population reached 5-6 billion.

The same fact also reveals the fact, however, that the state target of delaying the 1.2 billion mark year to the end of this century, which was much publicized in the 1980s after the launching of the "one child policy," was not achieved. The 1.2 billion mark year came six years earlier than desired.

Table 1 China's Total Population and Incremental Annual Growth

(in 10,000 persons)

<i>Year</i>	<i>Total Population previous years</i>	<i>Incremental growth over</i>	<i>Year</i>	<i>Total Population</i>	<i>Incremental growth over previous years</i>
1949	54,167	-	1972	87,177	87,177
50	55,196	1,029	73	89,211	2,034
51	56,300	1,104	74	90,859	1,648
52	57,482	1,182	75	92,420	1,561
53	58,796	1,314	76	93,717	1,297
54	60,266	1,470	77	94,974	1,257
55	61,465	1,199	78	96,259	1,285
56	62,828	1,363	79	97,542	1,283
57	64,653	1,825	80	98,705	1,163
58	65,994	1,341	81	100,072	1,367
59	67,207	1,213	82	101,654	1,582
60	66,207	-1,000	83	103,008	1,354
61	65,859	-348	84	104,357	1,349
62	67,295	1,436	85	105,851	1,494
63	69,172	1,877	86	107,507	1,656
64	70,499	1,327	87	109,300	1,793
65	72,538	2,039	88	111,026	1,726
66	74,542	2,004	89	112,704	1,678
67	76,368	1,826	90	114,333	1,629
68	78,534	2,166	91	115,823	1,490
69	80,671	2,137	92	117,171	1,348
70	82,992	2,321	93	118,517	1,346
71	85,229	2,237	94	119,850	1,333
			95	121,121	1,271

Note: Excluding Taiwan, Hong Kong, and Macao.

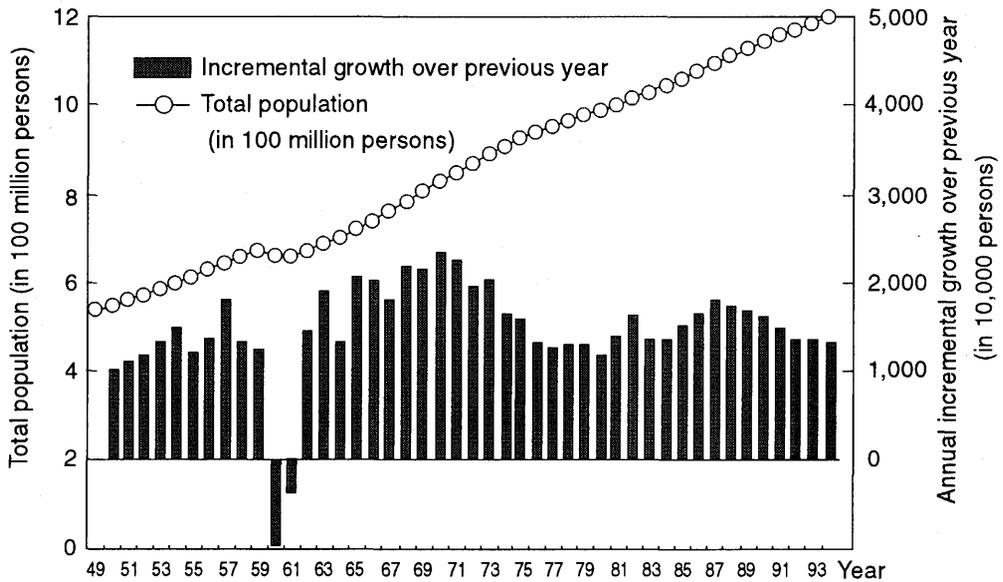
Source: State Bureau of Statistics of China.

The United Nations medium estimate of the Chinese population, which is shown in Table 1, projects Chinese population at over 1.5 billion in 2025 and 1,605,990,000 in 2050. The high and low estimates for 2025 are 1,666,590,000 and 1,363,000,000, respectively.¹ These estimates also note a rapid increase in the weight of the aged population above 65 years old (Table 2).

In 1995, the World Bank gave slightly more modest figures than the U.N. medium estimates: 1,555,810,000 in 2050 (19.31% over the age of 65) and 1,673,780,1000 in 2150 (24.80%).²

The following predictions were also made regarding the future of the Chinese population:

First, the Chinese population will be as large as that of all the advanced countries combined by around 1997. It will surpass them sometime in the subsequent five years.

Figure 1 China's Total Population and Annual Incremental Growth

Source: Same as Table 1.

Second, India will outstrip China in terms of population by around 2035 (because India failed to adopt proper population control measures in the 1970s, its population will continue to explode and reach 2 billion in 2150).

Third, the Chinese population will stabilize in the middle of the 21st century and will fall back to approximately 1.389 billion by 2150.

Under the Ninth Five Year Program (1996-2000) adopted by the State Council and implemented since the end of January 1995, as well as the Chinese Planned Parenthood Program (1995-2000), the guiding policy of planned parenthood, the population control targets were revised to 1.230 billion at the end of 1995 and 1.3 billion or less at the end of the century.

The Chinese government intends to hold the continental population in the range of 1.5-1.6 billion at the middle of the 21st century, achieve zero growth by about that time, and then begin to gradually reduce it.

It estimates the population in the year 2030 at 1.63 billion with the population over the age of 60 down to 300 million, of whom 260 million will be residing in the countryside. The natural annual population growth rate fell from 2.58% in the 1970s to 1.12% in 1994, but even with this lower rate, there will be 21 million births annually.

The total fertility rate (the average number of children a woman gives birth to in her lifetime) fell from 5.81 in the 1970s to around 2.0 in 1993. This is lower than the accepted equilibrium rate of 2.1, at which population is kept constant.

This announced rate, though, is believed to be too low. At the New York Pre Conference for the U.N. Conference on Population and Environment, China faced criticism on this score. Critics not only cast doubt on the authenticity of the Chinese figure, but also

Table 2 Estimates of Future Chinese Population (Estimated by the United Nations, 1994)

(In 1,000 persons; %)

	Year	Population			Share of age group			
		Total Population	0-14 years old	15-64 years old	65 years old or above	0-14 years old	15-64 years old	65 years old or above
High estimate	1990	1,155,305	317,365	773,241	64,699	27.47	66.93	5.60
	1995	1,229,522	330,569	824,286	74,667	26.89	67.04	6.07
	2000	1,305,975	346,979	872,647	86,351	26.57	66.82	6.61
	2005	1,376,058	343,545	935,896	96,615	24.97	68.01	7.02
	2010	1,446,003	349,296	990,714	105,994	24.16	68.51	7.33
	2015	1,521,116	360,011	1,037,325	123,780	23.67	68.19	8.14
	2020	1,595,682	377,793	1,061,395	156,495	23.68	66.52	9.81
	2025	1,666,589	394,393	1,090,943	181,255	23.66	65.46	10.88
	2030	1,731,747	403,373	1,112,665	215,707	23.29	64.25	12.46
	2035	1,793,192	413,277	1,120,685	259,233	23.05	62.50	14.46
	2040	1,855,953	427,932	1,137,319	290,702	23.06	61.28	15.66
	2045	1,918,326	446,948	1,178,354	293,024	23.30	61.43	15.27
	2050	1,979,157	465,437	1,221,901	291,820	23.52	61.74	14.74
Medium estimate	1990	1,155,305	317,365	773,241	64,699	27.47	66.93	5.60
	1995	1,221,462	322,509	824,286	74,667	26.40	67.48	6.11
	2000	1,284,597	325,600	872,647	86,351	25.35	67.93	6.72
	2005	1,337,311	304,799	935,896	96,615	22.79	69.98	7.22
	2010	1,388,474	299,749	982,731	105,994	21.59	70.78	7.63
	2015	1,441,075	301,190	1,016,105	123,780	20.90	70.51	8.59
	2020	1,488,075	308,680	1,022,899	156,495	20.74	68.74	10.52
	2025	1,526,106	311,095	1,033,757	181,255	20.38	67.74	11.88
	2030	1,554,133	305,361	1,033,066	215,707	19.65	66.47	13.88
	2035	1,574,449	301,590	1,013,628	259,233	19.16	64.38	16.46
	2040	1,591,227	302,993	997,531	290,702	19.04	62.69	18.27
	2045	1,602,076	307,390	1,001,664	293,024	19.19	62.52	18.29
	2050	1,605,991	309,693	1,004,480	291,820	19.28	62.55	18.17
Low estimate	1990	1,155,305	317,365	773,241	64,699	27.47	66.93	5.60
	1995	1,216,089	317,136	824,288	74,667	26.08	67.78	6.14
	2000	1,265,889	306,892	872,647	86,351	24.24	68.94	6.82
	2005	1,301,231	268,718	935,896	96,615	20.65	71.92	7.42
	2010	1,326,814	243,412	977,408	105,994	18.35	73.67	7.99
	2015	1,348,339	227,020	997,539	123,780	16.84	73.98	9.18
	2020	1,361,692	218,148	987,050	156,495	16.02	72.49	11.49
	2025	1,363,000	209,292	972,454	181,255	15.36	71.35	13.30
	2030	1,350,678	194,162	940,809	215,707	14.38	69.65	15.97
	2035	1,325,808	178,724	887,852	259,233	13.48	66.97	19.55
	2040	1,292,860	166,979	835,180	290,702	12.92	64.60	22.49
	2045	1,250,899	158,696	799,179	293,024	12.69	63.89	23.43
	2050	1,199,919	150,913	757,187	291,820	12.58	63.10	24.32

Source: United Nations, *The World Population Prospects, 1950-2050*, The 1994 Revision, New York, 1994.

pointed to the negative human rights implications of the one child policy, with some doubting if China, with such a low birth rate, still needed assistance from the UNFPA.

Under the forementioned planned parenthood guiding policy, a policy goal is set to keep the natural annual population growth rate below 1% until the year 2000. But how can China break away from the vicious cycle in which rural poverty causes parents to desire more children, only to perpetuate poverty? As of the end of 1995, 71.15% (861,780,000) of China's population was still in rural areas.

The official Chinese stance is that the one child policy will have to be continued until the end of this century. It will not be until then that the men and women of the baby boom generation, who were born in the 1960s under misguided population policies, finish passing through their marriage and child-bearing life-stages.

2. THE SURFACING OF A SURPLUS AGRICULTURAL LABOR FORCE AND FLUIDITY AMONG THE PEASANTRY

Thanks to the new economic policies adopted in the 1980s, Chinese peasants were given the means and opportunities to find non-agricultural jobs while remaining peasants in their household registries. The people's communes were dissolved toward the end of 1982. Thus, a labor surplus which was long concealed under the system of collective farm management suddenly surfaced.

Table 3 Growth of Township and Village Enterprises (1978-94)

<i>Year</i>	<i>Number of enterprises (in 10,000 units)</i>	<i>Number of employees (in 10,000 persons)</i>	<i>Share of TVE employees in total labor force (%)</i>	<i>Total output of TVEs (in 100 million yuan)</i>
1978	152.42	2,826.56	9.30	493.07
79	148.04	2,909.34	9.50	548.41
80	142.46	2,999.67	9.60	656.90
81	133.75	2,969.56	9.20	745.30
82	136.17	3,112.91	9.40	853.08
83	134.64	3,234.64	9.40	1,016.83
84	606.52	5,208.11	14.50	1,709.89
85	1,222.45	6,979.03	18.80	2,728.39
86	1,515.30	7,937.14	20.90	3,540.87
87	1,750.24	8,805.18	22.50	4,764.26
88	1,888.16	9,545.46	23.80	6,495.66
89	1,868.63	9,366.78	22.90	7,428.38
90	1,850.40	9,264.75	22.10	8,461.64
91	1,908.88	9,609.11	22.30	11,621.69
92	2,079.20	10,581.10	24.20	17,975.40
93	2,452.90	12,345.30	27.90	31,540.70
94	2,494.50	12,018.20	26.90	42,588.50

Note: The figures for 1978-83 include only village-level enterprises and those for 1984 and later years include all TVEs.

With this, inter-industry and inter-regional migration of the peasantry emerged as a focal issue. Peasants began to shift (*zhuan yi*) from agricultural to non-agricultural industries, from subsistence paddy and cultivation-type farming to farming enterprises producing commercial crops, and moved from villages to small townships and medium-sized cities.

China's rural labor surplus, which was once sealed in the people's communes and thus concealed, now surfaced with the dissolution of the commune system and the loosening of the system physically binding peasants to rural areas. The Chinese peasantry is now disintegrating and becoming fluid on an unprecedented scale.

Township and village enterprises (TVEs) in the countryside (former people's commune enterprises and village- and township-managed enterprises) emerged as the major absorbers of the labor surplus. They grew explosively. As Table 3 shows, at the end of 1994, almost 25 million TVEs were operating, employing a little over 120 million workers.

In 1994, the Chinese agricultural population was 900,360,000, or 76.5% of the total population. Of the 450 million people working in the countryside, only 200 million are considered necessary for agriculture. The remaining 250 million are surplus population.

As 120 million of them are already being employed by local village and township enterprises, the net surplus is estimated at 120-150 million. Moreover, they are being joined by 20 million new people every year.

Chinese estimates tend to fluctuate quite largely, but the Chinese Academy of Sciences stated that there was a rural labor surplus of 260 million in 1990, which would increase to 310 million in the 21st century.³ This surplus population is the main cause for the phenomenon of internal migration called the "blind rush" (*mang liu*).

Sociologist Fei Xiaotong and others have advocated a "small town theory" (*Xiao cheng xiang lilun*), which recommends that rural population move within the rural areas from agricultural to non-agricultural jobs but not migrate to urban areas (using the slogan of "leave agriculture but not the village" [*linong bulixiang*]).

This policy was presented as the only adequate Chinese path toward modernization. In fact, policies formulated on the basis of this theory represented Chinese efforts to transform industrial and employment structures without inviting population concentration in the major cities, thus avoiding the serious ills of urbanization plaguing other developing countries.

These "small towns" for the time being are reasonable places for population to congregate without causing much harm. They are reservoirs for population. If they are closed, the consequence will be population explosion both in cities and in rural areas. If the more than 60,000 "small towns" all over the country can absorb 5,000 more people each, then they alone will be able to offer residence to 300 million people throughout the country.

Fei Xiaotong argues that the buildup of "small towns," along with that of minority areas, holds great promise.

A city planning conference held in 1980, in fact, hammered out a city development policy of "regulating the growth of large cities, developing medium cities in proper ways, and actively developing small cities."

However, we need to consider the results of a survey conducted in 1994 by the Chinese Communist Party and the government's agricultural departments on the fluidity of the rural work force in all parts of China outside of Tibet. According to this survey (shown in Table 4), 14.4% of the working population had flowed out of their proper areas. Of the 35,238 agricultural household members covered by the survey, 20,727 were in the work force. Of these, 2,986 had moved out of their original areas. The survey indicates clearly that population has moved from inland to coastal regions and from agricultural to urban areas.

Table 4 Migration of Rural Labor Force (1994)

<i>Survey item</i>		(%)			
		<i>Total</i>	<i>Eastern Area</i>	<i>Central Area</i>	<i>Western Area</i>
Gender	Male	75.19	70.49	71.90	82.30
	Female	24.81	29.51	28.10	17.70
Age composition	17 years old or below	4.51	3.31	5.00	4.39
	18-35 years old	71.43	71.07	74.17	71.05
	36-59 years old	23.31	24.79	20.00	23.68
	60 years old or above	0.75	0.83	0.83	0.88
Educational career composition	Illiterate	3.76	4.13	3.33	5.31
	Primary school graduate or equivalent	31.58	30.58	31.67	32.74
	Junior high school graduate	54.14	53.72	55.83	53.10
	Senior high school graduate	9.77	11.57	9.17	8.85
Technical capacity	Some technical skills	24.81	23.14	26.67	24.78
	Underwent professional training and education	10.53	12.40	8.33	11.50
Period of work as migrant worker	3 months or less	12.03	9.10	13.33	15.05
	3-6 months	20.30	15.70	19.17	25.66
	6-10 months	21.80	19.00	21.67	24.78
	10 months or more	45.87	56.20	45.83	34.51
Place of work(1)	Within own county	42.11	48.36	30.58	47.79
	Outside own county but within own province	27.82	33.61	23.97	25.66
	Outside own province	30.07	18.03	45.45	26.55
Place of work(2)	Cities	71.22	70.84	78.69	64.91
	Rural areas	23.48	25.83	18.03	26.32
	Others	5.30	3.33	3.28	8.77
Place of work(3)	Coastal areas	33.90	57.50	32.14	13.16
	Inland areas	61.02	39.17	64.29	78.07
	Others	5.08	3.33	3.57	8.77
Modes of working and living	Migrate and work with family member(s)	6.03	7.69	5.72	5.88
	Migrate and work with non-family member(s)	18.97	15.39	24.76	15.69
	Job found by friends and/or relatives already working as migrant workers	31.03	31.73	31.43	28.43
	In response to recruitment	2.59	2.88	1.90	1.96
	Village-organized group migration	0.86	0.96	0.95	1.96
	Through job-finding services offered by government agencies above the village level	3.45	3.85	3.81	2.94
	Through private brokering agencies	0.86	1.92	0.00	0.98
	Voluntary migration	33.62	31.73	28.57	42.20
	Others	2.59	3.85	2.86	1.96

Note: The original data are from a sample-based survey conditions of floating of rural work force conducted in 1994 by the office of fixed spot rural observation of the Ministry of Agriculture. This survey was conducted in all provinces, cities, and autonomous regions excepting Tibet, covering 318 villages and 7,677 farming households comprising 35,238 persons, of whom 20,727 were in the work force. Of the working population, 2,986 (14.4%) were working outside their respective areas. (The above table was made by Kazutsugu Oshima).

It can also be seen from the survey that more men migrated than women, that 18-35 year olds formed the largest migration group, and that the migrants had relatively higher educational achievements than others. Job finding services were provided not so often by village, township or higher-echelon government agencies as by their relatives and friends who had moved into cities earlier.

The increased fluidity of rural population involved negative aspects as described by such pejorative terms as "blind rush," (*mang liu de liu dong*), and "excessive birth guerrilla families" (*chao sheng youjidui*). But the same phenomenon had positive effects as well. For instance, it ensured a sufficient supply of cheap labor for the construction of the Pudong industrial estate in Shanghai and for other urban construction projects. In appreciation of this, the name for the migration began to change to "the tide of private workers." Recognizing the positive side of migration, source and recipient provinces began to meet and confer to adjust the size of the migration.⁴

The increasing worker migration from the countryside has changed cities as well. The cities have ceased to be communities based on closed economies and limited to a single function, and have now become multi-functional and have adapted to an open economy. This change has had great socio-psychological impact on the value systems of the citizens.

But this development has also begun to sharply contradict the strict status system, enforced since the mid-1950s, which divides people into fixed rural and urban registry statuses.

A re-examination of this binary system with a view to its eventual abolition has gotten under way in 1996, but this is not an easy task, as the system is so deeply entrenched in the Chinese social structures.

3. DIMINISHING CULTIVATED LAND AND DETERIORATING ENVIRONMENT

More and more cultivated land is being abandoned as peasants leave agriculture and move to major cities as seasonal workers. In addition, the best agricultural land tracts are being turned into factory sites, residential areas, and roads, particularly in the suburbs of major cities, as the "development boom" sets in.

Table 5 shows that not only has the total area under cultivation diminished, but also that cultivated land area per person dropped 50% from 1,800 m² in 1949 to 800 m² in 1994.

During the past 30 years, 15 million ha of agricultural land was transferred to other uses, according to Chinese government data. The area planted with grains dropped from 90.8 million ha in 1990 to 87.4 million ha in 1994, an annual decrease of 850,000 ha, or 1%. The years 1984 and 1985, in particular, saw an annual cultivated land contraction of 1.6 million ha (Table 6, Figure 2).

The Chinese Communist Party newspaper, *People's Daily* carried a front page editorial on February 8 1995 warning of the effects of the loss of about 400,000 ha (397,953 ha) of cultivated land in the single year of 1994 and of a total of one million ha in the period 1990-93. It called upon the nation to "defend agricultural land, our life-line."

An additional, and no less serious, problem is ecological deterioration. Loss of top-soil, desertification, salinization of soil, declining soil fertility, deteriorating grasslands, soil pollution, and other forms of soil erosion are now spreading alarmingly (Table 7). Water resources are being drained, and the rate of increase in the per hectare crop yield has

Table 5 Changes in Number of Agricultural Workers, Cultivated Area, and Cultivated Area per Capita

Year	A Number of agricultural workers (10,000 persons)	B Number of workers, A, engaged in forestry, live-stock, fishing, and irrigation work (10,000 persons)	B/A	C Total cultivated area (10,000 ha)	Cultivated area incremental growth over previous year (10,000 ha)	C/total population Average cultivated area per capita (areas per capita)	C/A Average cultivated area per agricultural worker (areas per capita)	Food production per capita (kg)
1949	16,549			9,788		18.1	59.1	209
1952	18,243			10,792		18.8	59.2	288
1957	20,566			11,183		17.3	54.4	308
1962	21,373			10,290		15.3	48.2	240
1965	23,534			10,359		14.3	44.0	272
1970	28,120			10,113		12.2	36.0	293
1975	29,946			9,971		10.8	33.3	310
1976	30,142			9,939	-32.0	10.6	33.0	308
1977	30,250			9,925	-14.1	10.5	32.8	300
1978	30,638	27,488	89.7	9,939	14.2	10.3	32.4	319
1979	31,025	27,835	89.7	9,950	10.9	10.2	32.1	343
1980	31,836	28,334	89.0	9,931	-19.3	10.1	31.2	327
1981	32,672	28,980	88.7	9,904	-26.8	9.9	30.3	327
1982	33,867	30,062	88.8	9,861	-43.1	9.7	29.1	351
1983	34,690	30,350	87.5	9,836	-26.6	9.5	28.4	378
1984	35,968	30,080	83.6	9,785	-50.6	9.4	27.2	393
1985	37,065	30,351	81.9	9,685	-100.7	9.1	26.1	361
1986	37,990	30,468	80.2	9,623	-61.6	9.0	25.3	367
1987	39,000	30,870	79.2	9,589	-34.1	8.8	24.6	372
1988	40,067	31,456	78.5	9,572	-16.7	8.6	23.9	358
1989	40,939	32,441	79.2	9,566	-6.6	8.5	23.4	364
1990	42,010	33,336	79.4	9,567	1.7	8.4	22.8	393
1991	43,093	34,186	79.3	9,565	-1.9	8.3	22.2	378
1992	43,802	34,037	77.7	9,543	-22.8	8.1	21.8	380
1993	44,256	33,258	75.1	9,510	-32.4	8.0	21.5	387
1994	44,654	32,690	73.2	9,491	-19.1	7.9	21.3	373

Note: 1) Of the rural workers, those in manufacturing increased from 17,340,000 in 1978 to 32,560,000 in 1989 and those in construction from 2,300,000 to 15,020,000 in the same period. 100-B/A indicates the share of non-agricultural workers including the manufacturing and construction workers. The share jumped from 10.3% in 1978 to 20.8% in 1989, and further to 26.8% in 1994.

2) The share of agricultural products in the total rural output declined from 82.5% in 1949 to 67.8% in 1978, and to 58.1% in 1984 while that of sideline business grew from 4.3% in 1949 to 14.6% in 1978 and to 21.9% in 1984.

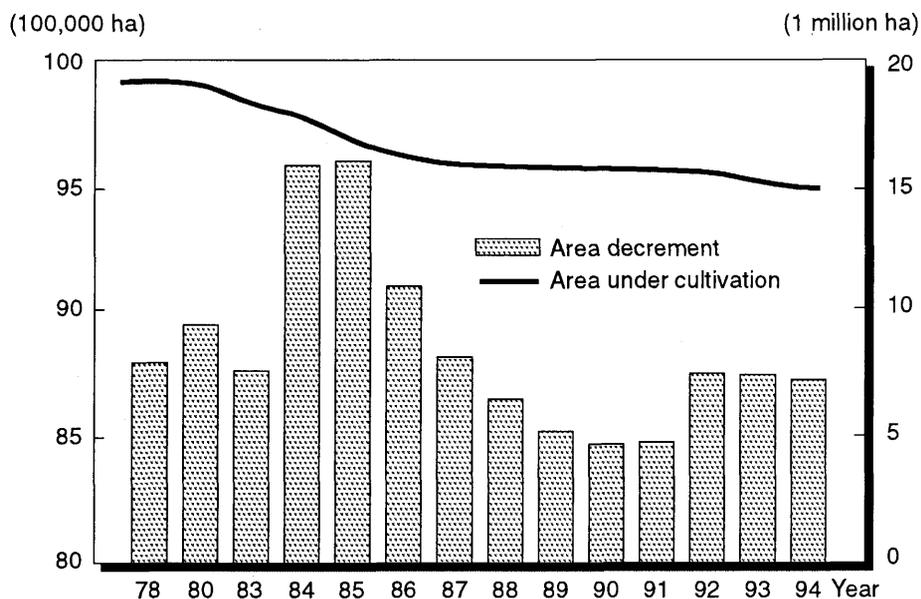
Source: Compiled from the Statistical Yearbook of China and Guo Shu Tien ed., *Zhongguo Nongcun gaige yu fazhan shi nian* [Ten years of reform and development of Chinese rural villages] (Beijing: Nongyei chubanshe [Agriculture Publishing Co.], 1990), p. 272

Table 6 Decreasing Cultivated Area (1978-94)

Year	Area under cultivation	Cultivated area decrement	Total area planted with agricultural products	Area planted with food crops
1978	99,390	800.9	150,104	120,587
1980	99,305	940.8	146,379	117,234
1983	98,360	768.0	143,993	114,047
1984	97,854	1582.9	144,221	112,884
1985	96,846	1597.9	143,626	108,845
1986	96,230	1108.3	144,204	110,933
1987	95,889	817.5	144,957	111,268
1988	95,722	644.7	144,869	110,123
1989	95,656	517.5	146,554	112,205
1990	95,673	467.4	148,362	113,466
1991	95,654	488.0	149,586	112,314
1992	95,426	738.7	149,007	110,560
1993	95,101	732.4	147,741	110,509
1994	94,907	708.7	148,241	109,544

Note: Cultivated area decrement represents decrement from the previous year.

Source: *Statistical Yearbook of China*, 1995

Figure 2 Change Over Time of China's Cultivated Area

Source: Same as Table 2.

Table 7 Present State of Land Resources and Their Problems (1991)

(1) Erosion of top-soil	The period of founding of the People's Republic of China 1,160,000 sq. km End of the 1950s 1,500,000 sq. km Present time 1,500,000-1,800,000 sq. km Agricultural land erosion is affecting 40 million ha with 1 billion tons of soil lost every year
(2) Desertification of land	334,000 sq. km affected, 24.2% in desertification process; 10.2% with 35 million population seriously affected
(3) Salinization	99,200,000 ha; 36,950,000 ha (37.2%) in salinization process
(4) Lowering soil fertility	Reduced input of organic fertilizer for the sake of increased yield undermines fertility; 59.1% of land suffers from lack of phosphor and 22.9% from lack of potash
(5) Deterioration of grassland	Grass output in grassland has declined 30-50% in the past 20 years; Grass quality has also deteriorated; 30% of grassland area has seriously deteriorated
(6) Pollution of soil	Polluted by three major types of industrial waste 4 million has of agricultural land polluted in early 1980s Acid rain affects 2,670,000 ha of farm land in 22 provinces
(7) Abandonment of land and transfer of land for other uses	Transferred to construction sites; in 1986-88, 211,050 ha transferred, most of the area the best agricultural land Loss of agricultural land; Every year 100,000-133,400 ha lost to flooding and desertification Barren land is left unattended; 4,670,000 h of cultivated land is either on slopes or exposed to desertification; transforming such land into forests or pastures is needed

Source: Compiled from Reeitsu Kojima & Kyoichi Ishihara ed., *Genten chugoku gendaishi (dai 3 kan) Keizai* [Modern history of China by archives, Vol.3, Economy](Iwanami Shoten, 1994), pp.270-271; the original data are from *Zhongguo tudi ziyuan shengchan nengli ji renkou chengzailiang yanjiu* [Study of China's land resource productive capacities and population loads], pp.21-22

resources are being drained, and the rate of increase in the per hectare crop yield has reached a limit.

There is little likelihood that China will be able to increase land productivity at a fast enough pace to compensate for the loss of farm land. Nor has China much arable land for future cultivation in spite of the vastness of its territory. China has only limited habitable land areas. Disequilibrium in the geographical distribution of population must also be considered: 94.2% of the Chinese population is in the territorial space east of the line running between Heihe in Heilongjiang and Tengchong in Yunnan, an area representing just 42.9% of the territory (Figure 3).

In August 1996, during a forum in Beijing on the prevention of desertification in Asia and Africa, convened jointly by the Chinese government and the United Nations, it was revealed that 3,327,000 km², or 34.6%, of Chinese territory had been desertified. Another

15 million ha of farm land was being negatively affected by desertification, resulting in drastic declines in crop yields.

A state report of the Chinese government directly attributed the rapid desertification to artificial factors such as excessive logging, grazing, cultivation, and water intake.

It admitted a general negative influence of desertification on ecological systems as a whole. It found that desertification had led to frequent sandstorms, which increased the quantity of sand and soil brought into the Yellow River and was causing the river bed to rise.⁵

After the presentation of this report, the Chinese government began to admit the seriousness of soil erosion. In September 1996, it was officially disclosed that soil erosion had affected 3.67 million km² of land all over the country.⁶

Since 1983, a soil erosion prevention program has been implemented in seriously affected areas totaling 80,000 km² in the nine provinces of Shanxi (Shansi), Shanxi (Shensi), Inner Mongolia, Liaoning, Jiangxi, Gansu, Beijing, Hubei, and Hebei. The second stage of this program for 1993-97 is now being implemented.

In fact, whenever environmental parameters are renewed, they invariably show an ever-worsening ecological situation for the country. Prevention of further environmental deterioration has emerged as an urgent national task for China.

4. PAUL EHRLICH'S FORMULA FOR POPULATION AND ENVIRONMENT

Paul Ehrlich, a professor of population studies at Stanford University, presented a famous formula on the interrelationship between population and environment.

As far back as 1968, he published *The Population Explosion*, pioneering a globalist approach to population problems. Four years later the Club of Rome published its *Limits to Growth* report. Prof. Ehrlich also masterminded the first U.N. inter-governmental conference on population, which was held in 1974 in Bucharest.

Ehrlich declared that population had already begun to explode. In 1990, he published a book titled *The Population Explosion*. In this book, he took into consideration a series of new phenomena which arose after 1969, such as the destruction of the ozone layer, global warming caused by excess emissions of carbon dioxide, the vanishing rainforests, the hazards of acid rain, and the AIDS pandemic. He concluded: "In 1968 there was an optimism that science would solve everything. . . . But this optimism about the ability of science is no longer realistic."⁷ On this basis, he proposed population control.

The Ehrlich formula is expressed as $I = P \cdot A \cdot T$. If the total impact of human activity at the global level ($I =$ Impact of Human Activity) exceeds the capacity of the earth (E), the ecological systems will deteriorate. He is an advocate of population control from the point of view of global environment.

Removing the imbalance between E and I requires either increasing E or decreasing I . However, E by definition cannot be increased. Worse still, E is decreasing as the renewable capital (capacity) integrated with E is being consumed and is diminishing. The logical conclusion is that I must be curbed.

I is the synthesis of affluence per capita, or the quantity of consumption per capita ($A =$ affluence) and technology ($T =$ technology) that generates affluence in various areas of life.

P , A , and T in this formula take on different values in developed countries (n) and developing countries (s). Thus, I is described as follows:

$$I = P \cdot A \cdot T = P_n \cdot A_n \cdot T_n + P_s \cdot A_s \cdot T_s$$

The problem is that I is expanding rapidly as population (P) explodes. The population explosion is occurring in the South, which already has a large population. The global situation is being aggravated by this.

Ehrlich sharply criticizes excessive consumption in the United States of America, demands value shifts, and calls for a transformation of society. He is an environmentalist and a practitioner, if somewhat extremist.

On the basis of this formula, Ehrlich proposes averting global destruction by (1) curbing population, (2) shifting the economic systems from growth-oriented ones to ones with a sustainable basis, through reductions in consumption per capita, and (3) reorienting science and technology toward environment-friendly goals. As a true environmental conservationist, Ehrlich puts forward the clear and simple argument that population explosion and mass consumption are devastating the global environment.

5. LESTER BROWN'S PREDICTIONS ON FOOD SUPPLY IN CHINA

Despite its strict one child policy, China is still experiencing a population explosion, with 13 million people being added to its already huge population every year. While this creates a number of problems, global attention is also focused on the relationship between the Chinese population and global food problems.

Lester Brown, president of the U.S.-based group Worldwatch, in *Who Will Feed China?* and *The Threat of the Stomach of Growing China* as well as in other recent writings in *World Watch*, points out that China holds the key to global food problems. He observed:

China is expected to experience a population increase of 490 million in the forty years from 1990 through 2030 so that its population will exceed 1.6 billion. Its economy also grew 13% a year in 1992 and 1993 and 10% in 1994 (40% in the four years). With the rise in people's income, the eating life of China diversified, causing demand for grains to expand.⁸

China's rice paddy cultivation acreage peaked at 33.1 million ha in 1990 and subsequently fell to 32 million ha in 1992. In those three years, farm land areas equivalent to one third of Japan's paddy fields were transferred to non-agricultural uses. Increases in crop yield per area are slowing and the cultivated acreage diminishing, while the demand for meat, milk, eggs and other sources of animal protein is on the rise. Under these circumstances, China will become more dependent on imports and might even drain global crop production capacity.

Since marine resources are decreasing globally, China will not be able to look toward the sea for protein sources as Japan did. As they have become affluent, Chinese have begun to drink beer enthusiastically. He estimates that if every Chinese adult drinks one more bottle of beer a year, 370,000 tons more grain will be needed.

Given the rapidly rising demand for grain, the seemingly feasible solution for China would be to open up new fields to produce additional grain. But despite its vast territory, China can only produce food crops in relatively narrow areas on the south and eastern

coasts, the rest of the territory being dry and barren areas. China cannot hope to increase food production in this manner.

Supposing that by 2030 China's grain consumption per capita increases from the current level of 300 kilograms a year to the current Taiwan figure of 400 kilograms, its food demand, taking population growth into account, will rocket to 641 million tons while its food production will remain at 272 million tons. China will suffer from a food shortfall of 369 million tons.

It would be impossible to meet this shortage, even if the world surplus was exhaustively mobilized to supply China. "Who Will Feed China?" Brown asks. The yawning gap between global food supply and demand caused by China's burgeoning demand is likely to create a chaotic world situation. A number of countries will be forced to engage in struggle to obtain crops on the global market, causing grain prices to soar.

Brown's contention provoked a reaction from China. The Chinese Ministry of Agriculture disputed this, arguing that China's food imports accounted for just 2% of its consumption, as food self-sufficiency remained fundamental Chinese policy. China argued that it was following its other three integrated basic policies, namely, family planning, environmental conservation, and farm land protection. On this ground, it contended that Brown's conclusion was wrong, and that it only provided ammunition to politicians who looked unfavorably at China's remarkable development. This was why, they said, people were clamoring about the Chinese threat.

What, then, are the realities?

According to the State Bureau of Statistics of China, China's total food production in 1944 declined 2.5%, or by 13 million tons, from the previous year. The output of all staple products including wheat, rice, and maize, decreased.

A Chinese government decision made in December 1994 shocked the world grains market, and, in particular, the Japanese market. China decided to suspend rice exports and to import a large quantity of wheat in order to ease the tight supply-demand situation in the country. Until that time, China had boasted of its (even if only barely maintained) food self-sufficiency. But now China was admitting that it had no choice but to depend upon the world grain market to feed its people.

During that year, China imported 510,000 tons of rice, 410,000 tons more than in the previous year. Rice imports had to be increased because of the tight supply inside the country, partly as a result of the export of one million tons to Japan in the previous year as well as production declines due to natural disasters. In December, China purchased one million tons of maize from the United States. Then, in March of the next year, China suddenly stopped exporting soybeans. It ceased to be a soybean exporter and became an importer. Commercial transactions for soybeans also ran into trouble. The result was that the domestic prices of soybeans rose above international prices.

Crop harvests in China have always influenced international grain prices. If China is forced to restrict grains export for a long time, the international grains market may become unstable. It is still fresh in our memories that Japan's emergency rice imports caused a rise in international rice prices. Even without Lester Brown's prediction, it is easy to see that China's increasing food imports will significantly affect international food markets.

In September 1995, even as the "Lester Brown typhoon" continued to rage, a forecast was announced on the basis of a joint Sino-Japanese study. It found that China would be importing a large quantity of food by the year 2010. This indicated that China had switched from total rebuttal to partial admission of Brown's prediction.

Table 8 Enlargement of the Unbalance of Food Supply and Demand

		(10,000 tons)			
		1993	2000	2005	2010
Detailed Estimation of Food Supply and Demand by OECF	Rice	1,049	1,303	869	-70
	Wheat	-1,080	-1,451	-1,354	-1,760
	Corn	871	-1,393	-4,037	-7,567
	Soybean	592	-108	-437	-842
Total		2,442	-2,384	-6,906	-13,631
World Watch Institute in USA		-2800	-8100	-11800	-15600

Note: OECF predicts that the population in 2010 will be 1.45 billion.

Source: Research Institute of Development Assistance, OECF, *Chugoku no syokuryo jukyu no mitooshi to nogyokaihatsu seisaku eno teigen* [The proposal of agricultural development policy based on the prospects of food supply and demand in China], 1995, p. 29.

The joint study was undertaken by China's Ministry of Agriculture and the Institute of Development Assistance of Japan's Overseas Economic Cooperation Fund (OECF). The joint report was titled "Forecast of China's Food Supply and Demand and Proposals for Agricultural Development."

In the report, the OECF and the Chinese Ministry of Agriculture made forecasts about the supply-demand situations for different kinds of grains. According to these forecasts, which are shown in Table 8, China will suffer from a food supply-demand imbalance, centering on shortage of 136.21 million tons of grains, in 2010. There will be serious shortages of maize and soybeans, while the wheat shortage will persist.

Though this forecast falls below Brown's 156 million tons, still the predicted 136 million ton shortfall is alarmingly large considering that the world total of grain exports amounted to just 220 million tons in 1993.

Has Brown's warning been taken seriously? This author wrote about the debate over Brown's argument (as it was starting) in the context of the Chinese announcement that the Chinese population had exceeded the 1.2 billion mark in February 1995.⁹ Immediately following this (in the spring of the same year), China stopped its food aid to North Korea. During that summer, a heavy flood hit North Korea, triggering a serious food crisis. Given this situation, Lester Brown's estimate had a great impact on Korean and Japanese food policies and on world food markets in general. Considering that the total worldwide grain trade is around 200 million tons, the Brown-predicted Chinese food shortage of almost double that amount is a serious problem indeed.

There is no denying that Brown's figures are somewhat exaggerated. Yet it should be admitted, and is agreed by all observers, that China will have to cease to be a barely food-sufficient country and turn into a major food importer in the near future. All agree that Brown's observation, if somewhat erroneous in quantitative terms, is accurate qualitatively. As the 20th century comes to a close, Brown, in fact, is giving a necessary warning to all countries of the world.

6. CHINA'S 1.6 BILLION PEOPLE AND THEIR IMPACT ON THE WORLD AND ASIA

Which is more accurate and scientific, Lester Brown's pessimism or China's rebuttal? The answer will come in 25-35 years. More important than arguing which prediction is more accurate, is that we try to prescribe solutions for humankind with regard to our long-term food and population problems.

China's perception of the problems of population and environment, as expounded at the 1972 U.N. Copenhagen Conference on Human Environment as well as the 1974 U.N. Bucharest Conference on Population, was unimaginably optimistic. The Chinese were then saying that because people were the source of unlimited creative power, the notion that population increase itself could worsen and disrupt the environment and be a cause of poverty and underdevelopment was utterly groundless. Of course, such statements were politically motivated to support the positions of the Third World in that period.

China, as everybody knows, took a drastic turn in its population policy in 1979 in favor of the one child policy. What are its current positions on population and environment?

Wu Cang-Ping, a Chinese scholar of demography and vice-president of the Chinese Society of Population Study in a lecture in April 1992 the following:

Population is not the only factor that causes a deterioration of resources and environment conditions. But in developing countries like China, the huge population and the pressure of its further increase bring about environmental deterioration in manifold ways, both directly and indirectly, in the form of destruction of forestry, contraction and deterioration of cultivated land and grasslands, top soil erosion, desertification, shortages and pollution of plain water, waste from mineral resources, and air pollution.

Although serious attention is being paid to environmental disruption, a number of types of environmental disruption, such as desertification and acid rain, and of course global warming and destruction of the ozone layer, now have effects on foreign countries as well.

Wu thus pointed to the global implications of China's population control. He was very impressive when he emphasized that each country had the responsibility to curb population increase in order to contribute toward slowing the global process of population explosion, and that in this sense China's one child policy was contributing to the global goal.

In May 1995, Lester Brown made the following observations in his lecture titled "Can the Globe and Humanity Coexist in the 21st Century? — Food and Population":

From the point of view of human rights, we cannot tolerate China's population policy . . . however, I think China has managed population control quite well. Most of the people who look at the issue from the human rights angle now criticize China. But the evaluation may differ if the present is reviewed from a future point in the 21st century. There is a conflict between the two points of view.

Since its 1979 major policy change to the one child policy, China has been consistently questioning itself regarding a proper population target. In 1981, soon after the new policy was adopted, China announced that the optimum population level in 100 years would be 650 million. That figure was calculated from the projected pace of economic development as

well as the potential capacities of China's ecological systems, and water and earth resources, though, in particular, water resources.

However, China expressed a different view at the U.N. Conference on Population Aging in Vienna in July 1982. Reversely calculating from the ageing of Chinese society, the Chinese delegation at the conference conceded that 1.5 billion at the middle of the 21st Century would be an acceptable figure.

Later, in May, 1992, the Country Situation Study Group of the Chinese Academy of Sciences presented a report to the State Council regarding China's resource potential and policy measures. In this report published as *Kaiyuan yu jieyue-Zhongguo ziran ziyuan yu ren de ziyuan de qianli yu duice* (Resource Development and Resource Conservation — Chinese Natural and Human Resource Potentials and Countermeasures) (published by Kexue chubanshe in Beijing), the group predicted that China's population would reach 1.5 billion in 2020-30 (1.6 billion in 2050), reducing the cultivated land area per capita to 0.8 ha and water resources per capita to 1,800 cubic meters. At this point, China's agricultural resources, soil and water in particular, will reach critical exploitation limits.

In January 1992, the Committee for the Integrated Study of Natural Resources, under the Chinese Academy of Sciences, concluded from a study of available agricultural land and food production capacity that the maximum population China could feed would be 1.277 billion in 2000 and 1.548 billion in 2025. At any rate, 1.6 billion would be an absolute maximum. It would be absolutely impossible to feed 1.7 billion people in China.

China now feeds 22% of the world's population using 7% of the world's cultivated land area. The per capita land occupancy area of 0.086 ha is far lower than the world average of 0.3 ha. While China's population increased by 100 million in the past decade, its cultivated area has been decreasing by 300,000 ha every year (400,000 ha in 1994), and the cultivated area is plagued by top soil erosion (31%), salinization and degeneration into marshy fields (18%), and desertification (5%). The current average cultivated area per capita is less than half the 1949 average of 0.18 ha. As population increases, land not suited to agriculture is brought under cultivation, which in turn causes top soil erosion and leads to frequent flooding.

In October 1992, at the Fourth Congress of the Communist Party of the People's Republic of China, party secretary general Jiang Zemin declared, "We will seriously implement our basic national policy of suppressing population increase and strengthening environmental protection." He continued, "We will strengthen the environmental consciousness of the whole nation, protect and properly utilize land, forests, water and other natural resources, and endeavor to improve the ecological quality of the environment." At long last, China has integrated population issues with environmental issues, and is determined to tackle both seriously.

Who will feed China? This question by Brown is properly and realistically asked.¹⁰

Ultimately, China's challenge is the world's, for the success of this huge country in forging a new development strategy will affect all others. Like most developing countries, China has until recently had minimal effect on global environmental trends. But as its economy grows, it will begin challenging the far less populous United States as the leading contributor to many global problems. As China faces its limits, many of its development plans will have to be reconsidered; as other countries encounter the global limits raised by China's growth, they will have to reevaluate their own unsustainable economic plans as well.

Brown sees things correctly. As China's neighbor and as a crewmember of spaceship Earth, we ought to recognize China's population, food, and environment problems as a major problem of our own.

We Japanese should be aware that we are the country whose food policies will have to be reviewed in the most thorough manner, depending on what happens in our neighboring country China.

Notes

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10. Lester R. Brown et al. ed., 1995, op. cit., p114-115.

[Supplement]

The Three Gorges Dam Project and Problem of Community Relocation

1. OUTLINE OF THE PROJECT

I will now present a sketch, as objective as possible, of the currently topical issue of the relocation of 1.2 million people for the construction of China's Three Gorges Dam.

The Three Gorges Dam project involves the construction of the world's largest dam in a vast valley called Sanxia, which extends over 240 km along the Chang Jiang (Yangtze River) from Chongqing to Wuhan. While China has staked its prestige on this colossal project, which was started in 1993 and is slated for completion in 2009, heated exchanges have taken place over the pros and cons, mostly from the point of view of its environmental implications, both in China and abroad.

The Three Gorges project centers on the construction of the dam, but also comprises various other infrastructural projects, including the construction of ship gates and elevators and power plants. It also involves the relocation of people from the inundated areas.

The idea of the Three Gorges Dam, which was first presented by Sun Wen (Sun Yatvsen) in 1919, was a great dream for 70 years. In April 1992, the Fifth Session of the Seventh People's Congress adopted the Resolution on the Implementation of the Chang Jiang Three Gorges Project.

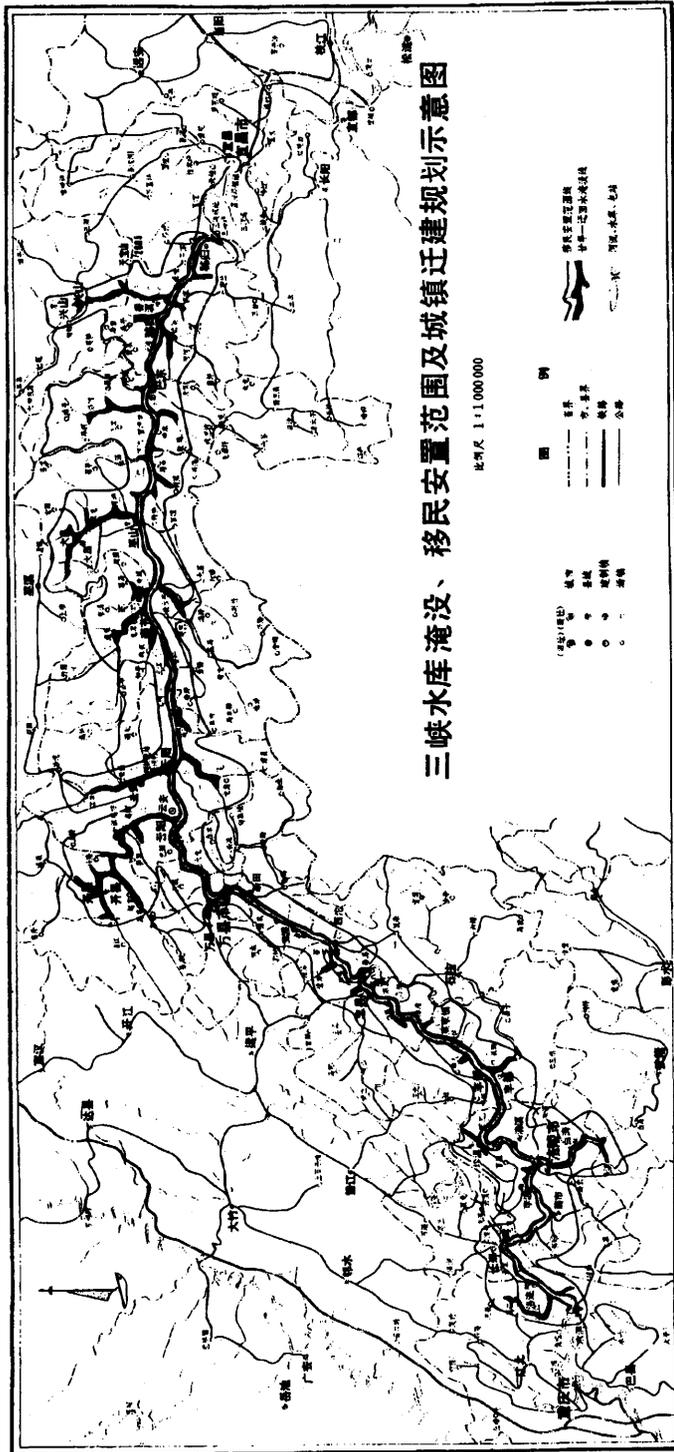
In 1993, the Three Gorges Project and Migration Development Bureau was established. In December of the following year, an inauguration ceremony took place at the Sandoping dam site in Xuanchang city, officially launching the project toward completion in 2009.

The projected dam will hold a maximum of 39.3 billion m³ of water, and will be equipped with 26 generators with a total output of 18.2 million kW. The project will absorb an investment of 90.1 billion yuan in May 1993 prices, including 40 million yuan for the relocation of the people from the submerged areas. A total of 632 km³ will be submerged, including 12,000 ha of farmland, with a current population of 850,000 people in 127 towns and 1,700 villages. The project will require the relocation of 1.21 million people by 2008.

The stated purposes of the dam project are: (1) flood prevention, (2) electric power supply, and (3) the expansion of sailing services on the river. Opponents point to the following negative aspects: (1) an unjustifiably large investment, (2) the danger of the dam functions being eventually lost because of soil sedimentation, (3) problems pertaining to ship navigation on the river, (5) the danger of provoking earthquakes and land slides, (6) vulnerability to nuclear missile attacks, (7) environmental issues, and (8) the question of whether the debates are being conducted democratically.

Here, let me focus on the issue of relocation of the inhabitants. The opponents assert that moving more than one million people and 1,600 enterprises "would make it impossible for the government to properly handle them, simply because of the enormous scale." They also warn that moving them to barren, hilly areas will lead to the destruction of the local flora and to soil erosion, causing floods.

Figure 4 Figure for the Inundation of Three Gorges Dam, the Migration Resettlement Area and the Urban Relocation Plan



Note: Within the bold line is the inundation area; Outside of the bold line is the possible area for migration resettlement.

Sources: Migration Development Bureau of the Three Gorges Construction Committee of State Council, 1995, *Zhongguo Sanxia gongcheng jianshe ji Sanxia diqu jinbu fazhan qingkuang jieshao* (Introduction to the Three Gorges Dam Project in China and the status of economic development in the Three Gorges Area).

Amidst this boisterous opposition, a key document titled, "The feasibility study report on the irrigation core of the Chang Jiang Three Gorges area," was completed and published in 1989. This report recommended that the relocation of residents in the inundated area be carried out continuously over a long period of time, and that the relocation program not follow the compensatory principle but rather the development principle, meaning that the relocatees be not simply paid livelihood compensation, but be given employment opportunities ensured through the launching of new businesses in the newly-settled areas. This formula, the report found, would alleviate the investment burdens on the government.

When the project proposal was put on the table at the People's Congress in April 1992, roughly one third of the deputies either opposed or abstained ([of the 2,608 members, 1,767 (67.8%) supported the proposal, 177 (6.7%) opposed it, and 664 (25.5%) abstained]). This demonstrated the presence of stubborn opposition to the project. Sustained opposition to state projects is rare in China.

Figure 4 shows the planned inundation area, which ranges over 600 km from Chongqing, 6,300 kilometers from the mouth of the river, to the dam site at Sensho City. It also illustrates the locations of human settlements in the inundation areas and the resettlement areas. The chart reveals the colossal size of this project.

2. IMPLICATIONS OF THE RESETTLEMENT OF 1.2 MILLION PEOPLE

The project involves the forcible relocation of two cities, 20 county areas, 11 county capital towns, 114 other townships, 356 villages, 6,530 village work teams, and 1,599 factories, and will force a total of 1.2 million people to move out of their current places of residence.

It was estimated that in 1985 725,500 (including 330,000 urban residents) were living in the inundation area, and that this number would increase to 1.13 million by 2008. Because the natural population growth is 1.2% per annum, it can be estimated that the final figures will be 1.2 million. The problem is how and where so many people can be resettled.

The area singled out for inundation, as anyone can see, is a fertile area which lies along the river. It is a very advantageous area for human habitation, and this is the reason why so many people have congregated along the river in dense population patterns, forming towns and cities, cultivating land, and setting up factories. The communities along the river have been formed through a long historical process. The inundation will affect not only those residing within it, but people on the outside as well. Many will have to move as they lose their schools or factories in the flood area. Others will lose homes and farmland as the evacuees enter their areas to create new settlements.

Incidentally, China has a history of experiences with large-scale community relocations. Between 1950 and 1989, according to the World Bank, 31,500,000 people were forcibly relocated. Between 1952 and 1989, 10.2 million people were evicted to make way for 86,000 dams. Another 7.4 million were relocated for the construction of railways, roads, canals, and airports. The construction of factories, urban redevelopment, and other infrastructural projects caused another 13.9 million to be relocated (Table 9).

Reflecting the characteristics of the Chinese state regime, these relocation projects were carried out in accordance with solid advance planning, but many problems did arise because the relocatees were regarded merely as the recipients of compensation. As a reaction to these

Table 9 Figure of the Relocated Inhabitants by Project in China

(10,000 persons)

	1950-59	1960-69	1970-79	1980-89	Total
Transportation	250	90	270	130	740
Dam	460	320	140	100	1,020
Urban redevelopment	150	130	260	850	1,390
Total	860	540	670	1,080	3,150

Source: World Bank, China and Mongolia Department, 1993, China Involuntary Resettlement Report NO 11641-CHA, cited in Shimomura Youko, "Sankyo Purojekuto kensetsu ni tomonau jumin iten, kankyomondai eno torikumi" [Studies on the Three Gorges Dam Project and the Resettlement and Environmental Issues], *Nichyuu Keizai Journal*, Apr., 1995.

problems, "development-oriented migration policy" was put into practice in 1984 on an experimental basis. The State Council, learning from these experimental experiences, issued a decree on the Chang Giang Three Gorges project migrants, giving a new legal form to the forced migration process.

The new policy rests upon the idea of a multi-purpose, integrated utilization of the migration fund. Not only will the fund be used for compensation for the relocatees, but also for the multi-faceted development of the new settlement areas in order to create conditions for the betterment of the livelihoods of the local people. The policy mapped out future development perspectives, taking into consideration the special characteristics of the Three Gorges area. The policy posits to increase the affected region's per capita GNP figure to approach, or even reach, the national average by 2010. To attain this goal, the Chinese government is now organizing a national mobilization of financial, material, and equipment resources in order to support the communities in the inundated areas. Manken, Sensho, and 15 other cities and counties are slated to be designated as part of a Three Gorges open economic zone accorded preferential treatment in inviting foreign capital.

Prime Minister Li Peng, at the project inauguration in December 1994, stated that the migration of the residents would be the key to the success of the project. He said, "The traditional way of writing off the issue of migration simply by paying compensation should be abandoned. The state should prepare farmlands and factories in the resettlement areas for the sake of the relocatees, not merely to prevent the standards of living of the relocatees from declining from their pre-relocation level, but also to ensure the prosperity of the resettlement areas. We must carry out this development-oriented relocation policy."

This "development-oriented relocation policy," according to the project promoters, goes beyond the payment of temporary monetary compensation and assures the relocatees proper jobs and living standards, even going so far as to assure them a higher standard of living. With regard to farming, the affected communities will be helped to shift their products towards higher productivity commodities such as fruits and tea. The farming households are also being encouraged to shift to secondary and tertiary industry through creation of village and township enterprises. The official slogan of the relocation project is thus smooth migration without resistance, resettlement with labor transfers, and higher living standards after relocation.

3. CONSCIOUSNESS OF THE RELOCATEES AND REACTIONS FROM ABROAD

The Institute of Population Studies of Wuhan University is studying "the Economic Development of Three Gorges Areas on the Chang Jiang River and Three Gorges Migration" as a priority research subject. In regards to the issue of where to move the one million level people, the institute laid out the principle that they should be relocated, preferably to the nearest possible location from their original residences. Only when such locations are unavailable should they be moved to other, more remote areas. This approach was based on a critical reflection on past failures involving large distance migration.

The principle concerning post-migration jobs laid down by the Institute of Population Studies is that young relocatees, below the age of 30, should be encouraged to transfer to new jobs at town and village enterprises and to other jobs in the secondary and tertiary industry. The state should preferentially invest in providing housing to relocatees in addition to creating jobs, and then proceed to invest in the betterment of their living standards.

The Institute conducted a survey on two typical agricultural villages in Fengjie county which are slated to be submerged. The results are given in Table 10.

The survey showed that peasants from villages in hilly areas with harsh natural environments and low living standards were hopeful of their future and felt that their livelihoods

Table 10 Estimation of the Conditions after Relocation of the Relocatees

		(%)	
		<i>Villages in suburbs</i>	<i>Villages in hilly areas</i>
Living condition	1. Better than now	17.6	37.5
	2. Not sure	29.8	42.9
	3. Worse than now	52.6	19.6
Production condition	1. Better than now	8.8	26.3
	2. Not sure	35.1	45.1
	3. Worse than now	56.1	20.6
Distance from the relocated area	1. Close to the village	52.6	35.7
	2. Outside of the village but within the county	8.8	41.1
	3. Outside of the county	8.8	16.1
	4. Wherever is fine	29.8	7.1
Resettlement mode	1. As a whole village resettling in one area	43.9	51.8
	2. As a area/group unit resettling in different area	21.1	26.8
	3. Forming a new unit with separated household units	-	-
	4. Live with relatives or a friend	-	7.1
	5. Whatever mode is fine	35.1	14.3

Source: Zhu Nong, "Sanxiakuqu yimin renkou xinli zhuangkuang fenxi" [Analysis of the Psychological Status of the Migration Population in the Three Gorges Area], *Jingji lilun* [Economic Theory], No. 3, 1995.

would improve. In contrast, peasants from vegetable- and other commercial crop-growing areas were pessimistic.

In the case of affected villages in the suburbs of cities, peasants will be moved to hilly or mountainous areas in the same villages if such substitute locations are available. Otherwise, they will be moved to locations outside of the original villages. In mountainous villages which lack any suitable resettlement sites, more villagers will be moved to outside areas, but this inspires them with optimism, for it can mean to them a change for the better.

As regards the modes of resettlement, generally speaking, a whole village, hamlet, or neighborhood will be moved to a single resettlement area. Migration by household unit is rare. It appears that the migration is being carried out systematically under the unitary leadership of the central state, and in observance of the principles laid down by the migration decree.

The Three Gorges project is being exposed, however, to severe criticism from abroad for reasons related to the environment and human rights. Asia Watch (based in New York) and the World Bank (in its feasibility study on this project) have declared clear opposition to the project from the point of view of protecting human rights. The U.S. and Canadian governments have expressed concern over the environmental effects, and are poised to suspend or cancel financial support for it. In the meantime, Germany, France, and Switzerland have volunteered to extend financial assistance.

It is a major project, discussed and debated for the past forty years, and finally launched at the risk of China's prestige, but it involves many unpredictable and disturbing factors. Evaluating them, particularly the project's environmental impact, is not easy at this stage. The governments involved have responded to the project differently, each on the basis of its own basic environmental policy. The Japanese government, too, ought not err in handling this issue. All told, the Three Gorges Dam project is still subject to many vicissitudes. It is certainly one of the few outstanding environmental issues of the 21st century, and is naturally a focus of international attention.