The Impact of 1995 Floods on Mainland China's Grain Production

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Since the establishment of the People's Republic of China (PRC) in 1949, floods have been an intensifying problem as they have hit major grain-producing regions and seriously affected grain yields.

In addition to climatic causes, man-made damage to the environment instigated by shortsighted policies has contributed to this serious problem. The situation has worsened with economic reform; irrigation systems are in serious disrepair and the infrastructure and conditions for agricultural production remain backward as investment has leaned to the industrial sector.

As a result, natural disasters have come to determine whether there will be a bumper harvest. The 1995 floods have damaged a large portion of the crops, and it is anticipated that 1995 grain production will be relatively low. As a further consequence, since grain price and inflation are closely related in the mainland, the recent floods and decreased 1995 grain production will likely kindle another round of inflation.

Keywords: flood, grain production, the Yangtze River, environment, irrigation

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Since 1949, more and more areas in mainland China have been afflicted by floods. Between 1950 and 1959, flood-afflicted areas totalled 22.25 million hectares; from 1980 to 1987, the number increased to 39.71 million. In 1991, the mainland witnessed its greatest flood this century. Regions affected included eighteen provinces in central, east, and south China which the Yangtze River runs through, all of them major grain-producing or industrial regions. In 1992 and 1993, floods temporarily subsided but returned in force in 1994 and 1995.

Great floods that used to come only once a century have now taken place at shorter intervals and had great impacts on the mainland's grain production. This paper will focus on these impacts. Since

grain price also affects inflation, floods may indirectly aggravate the serious problem of unemployment; this topic will also be discussed in this paper. We will begin by examining the damage caused by 1995 floods and their causes.

The Damage

In mid-May of 1995, the central, south, and eastern regions of mainland China suffered heavy rain which culminated in great floods in the middle and lower reaches of the Yangtze River and Dongting and Boyang lakes. The Xiang, Zi, and Yuan rivers all saw high water levels; the water levels of the middle and lower reaches of the last two rivers were perhaps the highest in their history. Water levels in the two lakes also rose drastically. The Yangtze River, affected by excess water from its branches and Dongting and Boyang lakes, thus suffered its second largest flood since the establishment of the People's Republic of China (PRC) in 1949.

The rain did not let up in the south until late July. In total, twelve provinces and regions were afflicted, with Jiangxi and Hunan being the most seriously affected. According to the statistics of the PRC's Ministry of Civil Affairs and Red Cross Society, up to July 15, 1995, a total of 150 million people were afflicted. The death roll was 1,495; over 50,000 people were injured; and 1.34 million houses collapsed, with another 6.57 million damaged. The immediate economic loss was over 60 billion *yuan*.[1] Nine provinces were the most severely afflicted (see table 1).

As the weather cleared in the south, the rain band moved northward and brought heavy rains in the Liao River in late July, creating a rare flood in the northeast. The most severely afflicted areas were Liaoning and Jilin provinces. According to incomplete statistics, the flood destroyed 380,000 houses and damaged another 1.1 million in Liaoning. About 6 million people were affected. In Jilin Province, most of the rainstorm-stricken areas were in mountainous or semi-mountainous sections, which were plagued by huge and rapid flows of water. The flood was a record high in the history of the province's seven rivers.[2]

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[1] *Ta Kung Pao* (Hong Kong), August 19, 1995, A4.
[2] *Wen Wei Po* (Hong Kong), August 10, 1995, A5.

Table 1
Damage in Flood-Afflicted Areas, 1995

	Hunan	Jiangxi	Hubei	Guangxi	Guizhou	Zhejiang	Anhui	Jiangsu	Fujian	Total
Afflicted people (million)	34.35	20.94	13.2	7.26	6.92	6.14	2.27	1.6	1.142	93.822
Death	540	242	56	23	98	31	48	14	29	1,081
Injured	14,582	5,915	1,318	185	826	134	318	260	207	23,745
Damaged house (thousands)	1,710	610	450	500	20	215	60	99.6	65	3,279
Collapsed house (thousands)	380	140	170	17.5	10	46.4	44	21.2	33.7	862.8
Damaged crops (million acres)	35.44	22.45	13.67	5.4	3.83	4.54	4.09	3.195	1.125	93.74
Economic loss (billion *yuan*)	13.5	12.7	1.89	1.2	0.8	2.4	1.1	0.78	0.79	35.16

Source: *Ta Kung Pao* (Hong Kong), July 19, 1995, A2.

The 1995 floods were characterized by heavy and frequent rainstorms, concentrated rainfall, and strong water flow. As a result, many areas were continuously or repeatedly hit by floods, and severely afflicted areas were concentrated. In addition, because the floods came on too strongly and quickly, most of the victims lost everything they owned. Dead livestock in flooded villages caused pollution to the environment and illness. The industrial and business sectors and many public facilities were also severely damaged.[3]

The Causes

Mainland China is a vast country, with 63 degrees of longitude separating its eastern and western borders and over 35 degrees separating north and south. There are tropical, temperate, and frigid zones, and wind direction changes with each season. The climate is complicated and constantly changing. With such a large area and range of conditions, the chance for natural disasters is greatly increased. In terms of climate, mainland China's natural disasters can be related to cyclical changes in global climate. In a nutshell, global rainfall is in a relatively stable condition, and its distribution is influenced by changes in atmosphere circulation. Excess or lack of waterfall will lead to flood or drought. In recent years, south China has happened to be in a peak rainfall period, and thus has been vulnerable to flooding.[4] Global warming and rising temperatures have also caused ice layers on the Qingzang [Qinghai and Xizang] Plateau to melt, leading to a drastic increase of water in the headwaters of the Yangtze River, which then naturally flowed into its branches and connecting lakes.

An accumulation of man-made damage to the environment through shortsighted policies has been another important cause of the disasters. As early as the 1950s, in the national "Great Leap Forward" campaign to produce steel, forests were cut down to serve as

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[3]It should be noted that although floods caused the most serious damage, other natural disasters should not be overlooked. Between March and July 1995, drought hit the coastal regions of Fujian and Guangdong provinces and Henan, Hebei, Shaanxi, Shanxi, Shandong, Anhui, Gansu, Qinghai, Xinjiang, Ningxia, and inner Mongolia. For a period of four months, a section of the Yellow River about 622 kilometers long even ran out of water, a record high in both length and time frame. See *People's Daily* (Beijing), July 18, 1995, 4.

[4]*Wen Wei Po*, August 1, 1995, B5.

fuel. In the Cultural Revolution, the policy of reclaiming grain from desolate mountains also damaged the forest reserves. During the promotion of economic reform in the 1980s, driven by the policy of maximum economic benefit, people engaged in many short-term profit-making activities, paying no attention to impacts on the ecology. Trees were freely chopped down in the name of profit and developing a variety of business operations. Sometimes the cadres of the Chinese Communist Party (CCP) led the way in robbing the forest. As a result of these operations, the mainland's forest cover has sharply declined. Since 1949, forest cover in the Changbai Mountain area, which is known for rich forest reserves, has dropped from 82 percent to 8 percent. The overall forest cover in mainland China is currently only 9 percent; its forest per capita ranks 120th in the world, and its average forest growing stock per capita ranks 121st, trailing far behind other countries.

As forests were destroyed, their function of restraining headwaters was weakened. Almost one-third of the whole Yangtze River basin suffers from soil erosion; a total of more than 2.2 billion tons of soil has already been eroded.[5] Each year, about 100 million cubic meters of mud silt up in Dongting Lake, and the lakebed is raised three to four centimeters. The rate in the western reaches of Dongting Lake has been even faster, at about seven centimeters a year. Since the 1950s, mud deposits have reached a depth of four to five meters. The shallow lakebed has placed additional pressure on the river. Since 1958, the area of Dongting Lake has shrunk about 40 percent, and Boyang Lake has replaced it as the largest lake in mainland China.[6] Its function of regulating the Yangtze, Xiang, Zi, Yuan, and Li rivers has been weakened. Since the promotion of economic reform, hotels have been built around many of the dams to develop tourism,[7] worsening silt and dam pollution.

In addition, under the guiding principle of "taking grain as the key link" (*yi liang wei gang*), the number of lakes has decreased as more and more land has been reclaimed and new dams have been built. In the 1950s, there were about 1,400 lakes in Hubei Province;

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[5]*Zhongguo shibao* (China Times) (Taipei), August 7, 1995, 9.

[6]Huang Yuyong and Su Peng, "Disaster Hits Dongting Lake, Rain Distribution Uneven," *Ta Kung Pao*, July 23, 1995, A2.

[7]Li Siqing and Ke Wenzhong, "Stop Turning Dams into the West Lake," *Guangming Daily* (Beijing), Feburary 9, 1995, 4.

currently there are only about 800 left, as over 600 smaller lakes have been reclaimed. The case in the Yangtze River basin is no different. In 1949, there were 1,066 lakes in the basin, yet by the 1980s, only about 300 were left. The total area of the lakes in the region shrank over two-thirds, from 12.5 million to 3.5 million acres.[8] Economic reform has furthered the trend of reclaiming land from rivers, lakes, and the sea. Currently, less than 200 lakes remain, and their total area is only one-fourth of that in 1949; their ability to prevent and restrain floods has been seriously impaired. In addition, rivers and floodways have been overtaken by factories, piers, crops, water-resistant plants, or even garbage. As a result, floodways have been greatly obstructed.

Lack of irrigation system maintenance is also a reason why the mainland has been susceptible to natural disasters. Although the mainland has built over 80,000 dams of all sizes over the past four decades, most of them were erected in the 1958 "Great Leap Forward" campaign and during the Cultural Revolution, and their quality is questionable. About 80 percent of the irrigation canals are made of mud, and the possibility of leaking and seeping is high. Each year, about 140 billion cubic meters of water has leaked or seeped through.[9] As for irrigation investment, the government has always favored building new systems to repairing the old ones. Therefore, although irrigation infrastructure construction has increased year by year, the existing facilities lack maintenance and cannot function properly. Since economic reforms began, communes have been disbanded, and the family became the basic village production unit. Although this small-scale economy is self-supportive, it does not have the ability to build irrigation systems; this has been detrimental to the development of such an infrastructure. Although the central government has delegated the responsibility of repairing irrigation systems to respective provinces and cities, local governments usually have had little interest, as they consider irrigation projects such as building dams and cleaning up canals as not cost-effective and of little economic benefit. Investment has leaned heavily to the indus-

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[8]Wang Da and Wang Mingna, "Deforestation Along the Yangtze River Basin and Its Ecological Deterioration," *Huanjing baohu* (Environmental Protection) (Beijing), 1988, no. 2:16.

[9]Ke Xing, "Irrigation Construction in Mainland China," *Talu jingji yanjiu* (Study of Mainland China's Economy) (Taipei), 1988, no. 7:40.

Table 2
Government Expenditures in Agriculture, 1952-93

Year	Agricultural expenditure (billion *yuan*)	Percentage in total government spending (%)
1952	0.904	5.1
1957	2.350	7.7
1962	3.823	12.5
1965	5.498	11.8
1970	4.940	7.6
1975	9.896	12.1
1978	15.066	13.6
1979	17.433	13.7
1980	14.995	12.4
1981	11.021	9.9
1982	12.049	10.4
1983	13.287	10.3
1984	14.129	9.1
1985	15.362	8.3
1986	18.420	7.9
1987	19.572	8.0
1988	21.407	7.9
1989	26.594	8.7
1990	30.784	8.9
1991	34.757	9.1
1992	37.602	8.7
1993	44.142	8.4

Source: State Statistics Bureau, ed., *Zhongguo tongji nianjian 1994* (Statistical yearbook of China 1994) (Beijing: Zhongguo tongji chubanshe, October 1994), 219.

trial sector, as investment in agriculture has decreased year by year (see table 2). As a result, irrigation systems are in a serious state of disrepair and cannot fully carry out its function of withstanding natural disasters, including heavy rain.

The Floods' Impact

With the crops heavily damaged and cultivated land flooded, provinces including Hunan, Hubei, and Jiangxi which are known as the "*Jiangnan micang*" (the barn south of the Yangtze River) have been seriously afflicted. Among the social and economic sectors in the mainland, the agricultural sector, in particular grain production, has suffered most from the disasters.

Feeding a vast population of more than one billion people has always been a heavy task in mainland China; this is clear in the policy of "taking grain as the key link." Usually, there are two ways to fulfill the need: increase domestic production and import foreign grain. However, the latter depends on the country's ability to pay foreign currency, and has a certain degree of political risk.[10] In addition, it is questionable whether the world's grain market has sufficient supply for such a large market as mainland China. Lester Brown, director of the World Watch Institute in the United States, once pointed out that until the year 2030, mainland China will be short by 216 million tons of grain, yet the world can only export 200 million tons. Therefore, grain shortage will cause a tension in the world grain market.[11] Naturally, the PRC reputed the comment immediately,[12] yet Jiang Zemin, general secretary of the CCP and president of the PRC, admitted that if the country's agriculture and grain production encounter difficulties, no other country can help. It is apparent that importation cannot solve mainland China's problem; it must be resolved by increasing domestic production.

However, the development of the mainland's grain production has been similar to that of its economy in that it has been full of fluctuations. Whenever the situation has improved, the trend has often been followed with a decline. For example, in the early phase of the PRC regime, after grain output per capita rose from over 200 to 306 kilograms in 1958, grain production took a deep dive. It was not until 1976 that the standard was restored to that of 1958. Reform has not changed the situation. The promotion of production responsibility system helped boost production, as output per capita reached 350 kilograms in 1982 and hit a record high of about 392 kilograms in 1984. However, as investment in agriculture was halted, so were increases in grain production.

In 1988, the grain output per capita dropped to a low of 309 kilograms, prompting renewed efforts from the PRC, and in 1989, total grain production broke 1984's record for the first time. The

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[10]Institute of Agricultural Economics of the Academy of Agricultural Sciences, "Grain Issues in China: A Macroeconomic Analysis," *Nongye jingji wenti* (Problems of Agricultural Economy) (Beijing), 1995, no. 2:5.

[11]Gong Guangyu, trans., "Who Will Feed China?" by Lester Brown, in *Fuyin baokan ziliao: Nongye jingji* (Reprinted Materials of Newspapers and Magazines: Agricultural Economics) (Beijing), 1995, no. 6:37-41.

[12]*Wen Wei Po*, Feburary 22, 1995, A3.

Table 3
Grain Production of Mainland China, 1978-94

Year	Total output (million tons)	Output per capita (kg)
1978	304.77	318.74
1980	320.56	326.69
1983	387.28	378.46
1984	407.31	392.84
1985	379.11	360.70
1986	391.51	367.00
1987	402.98	371.74
1988	394.08	357.72
1989	407.55	364.32
1990	446.24	393.10
1991	435.29	378.26
1992	442.66	379.97
1993	456.49	387.37
1994	444.50	376.00

Sources: *People's Daily* (Beijing), April 2, 1995, 2; *Zhongguo tongji nianjian 1994*, 31, 345.

PRC thus claimed that the agricultural stagnation of the previous four years had ended. However, since grain is directly or indirectly used as food, the population must be taken into account in order to accurately judge the numbers. In terms of output per capita, 1989 grain production could not live up to 1984's standard (it was about 25 kilograms lower).[13] Even as recently as 1994, 1984's standard had not been challenged (see table 3).

The annual decline in cultivated land is also accountable for decreasing grain production. During the Sixth Five-Year Plan period, there was an annual net decrease of about 7 million acres in cultivated land. This was brought to the central government's attention, and after strengthening management, the net decrease in cultivated land was reduced to 4 million acres in the Seventh Five-Year Plan period. However, in the Eighth Five-Year Plan period in the 1990s, economic development and the quickening pace of urbanization hastened the trend of occupying cultivated land once again. In this period, main-

[13]Chen Jiyuan and Mo Weiguang, "China's Agriculture—Grain Production in Severe Situation," *Ming Pao yuekan* (Ming Pao Monthly) (Hong Kong), 1991, no. 1:41.

land China has lost 60 million acres of cultivated land.[14] The average area of cultivated land per person has dropped to 1.2 acres, and in one-third of the provinces and cities, less than 1 acre. In Guangdong, Fujian, Zhejiang, and Shanghai, it is even far below 0.6 acres.

In the Sixth and Seventh Five-Year Plans periods, cultivated land was often illegally taken by individuals or cadres to build houses. Cases involving relatively small parcels of land were easily handled. However, in the Eighth Five-Year Plan period, cultivated land was occupied on a much larger scale by government agencies or business units to build developmental zones. According to a survey of twelve provinces and cities in 1993, including Guangdong, Zhejiang, Hebei, and Sichuan, provinces and cities had built a total of 1,507 developmental zones of all natures. Among them, only 310 which totalled 9.9 million acres were approved by the central government, and 80 percent of them were cultivated land. Because this mostly took place in the south, where the economy was flourishing but grain production was also important, it brought significant changes to the mainland's grain production structure: the old structure of "supplying the north with southern grain" has in effect been reversed.[15]

Since aquatic rice is the south's basic crop, changes in rice sowing area can reveal the trend of the south's decreasing grain production. For example, the sowing area of aquatic rice in 1993 was 2.713 million hectares less than that in 1990, or more than 69.98 percent of the total decrease in cultivated land. The percentage of rice sowing area to that of total grain dropped from 29.14 percent to 27.47 percent.[16] In 1994, the sowing area for grain further declined to 108.8 million hectares, 1.067 million hectares less than that in 1993 and below the security line. Rice saw the largest decline in sowing area.

With insufficient investment in agriculture, backward infrastructure and conditions for agricultural production, lack of momentum for further development, and the decrease in cultivated land, agricultural production for the most part is determined by weather. Any climatic abnormality leads to trouble in grain production. Above all,

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[14]Wang Chuanwei, "Why Is It So Hard to Protect Cultivated Land?" *People's Daily*, April 10, 1995, 9.

[15]Huang Aijun, "Possible Trend of Significance of Different Grain-Producing Regions in China," *Nongye jingji wenti*, 1995, no. 2:20.

[16]Ding Shengjun, "Grain in China: Current Situation, Estimate, and Ways Out," *Nongye jingji wenti*, 1995, no. 8:22.

natural disasters have become an important indicator of a bumper harvest. For instance, 1994 witnessed severe natural disasters, and grain production in some areas was seriously afflicted; overall grain production was down 12 million tons from 1993, a decrease of about 2.5 percent.[17] Disasters were more serious in 1995. Although floods took place after summer harvest, a large portion of crops was destroyed. For example, 15 million *jin* of grain in the Hunan state warehouses were soaked and spoiled. Although the heavy rains have let up slightly, the floods have not subsided, and this will have an impact on the upcoming sowing season.

Northeast China is also one of the mainland's major grain-producing regions and was supposed to compensate for the two flooded lakes. It was expected that northeast China's autumn harvest could meet emergency needs, but because it too suffered from the flood, its grain production is anticipated to decrease. The resultant impact on the mainland should not be dismissed.

Reform has brought about inflation; between 1988-89, the inflation rate was as high as 40 percent, and skyrocketing prices in the cities were one of the causes of the 1989 pro-democracy movement. It has become important for the PRC to reduce high inflation rates while promoting reform. In the mainland, inflation is especially related to grain price; in table 4, the relationship is shown in the comparison of the retail price index and grain price. In 1994, the inflation rate was over 25 percent, mainly because the decrease in grain production led to tensions between supply and demand and a subsequent price rise for grain, agricultural products, and nonstaple foods. The 1995 floods and the resulting decline in crop production will probably rekindle inflation.

Disasters also have had a negative impact on the mainland's reemerging problem of unemployment. For a long time, because of its vast population, rigid labor employment system, and stagnant economic development, unemployment had been a troublesome issue. During the early phases of economic reform, delegation of power to enterprises livened up the economy, and the loosening of the ownership system provided many job opportunities. However, the effects of these policies have gradually withered away. As the newer generations of baby-boomers became old enough to enter the labor market,

[17] *People's Daily*, April 2, 1995, 2.

Table 4
Retail Price Index, 1978-93

Preceding year = 100

Year	Overall index	Consumer goods	Food	Grain
1978	100.7	101.5	101.5	101.3
1979	102.0	102.1	105.5	103.7
1980	106.0	107.1	110.5	103.5
1981	102.4	102.6	103.7	103.9
1982	101.9	101.9	102.8	100.2
1983	101.5	101.2	102.4	99.9
1984	102.8	101.7	102.6	99.8
1985	108.8	109.4	114.4	110.9
1986	106.0	106.5	107.4	109.3
1987	107.3	107.4	110.1	106.2
1988	118.5	119.0	123.0	114.1
1989	117.8	117.5	116.2	121.3
1990	102.1	101.6	100.3	95.2
1991	102.9	102.9	103.3	108.6
1992	105.4	105.6	107.7	124.3
1993	113.2	113.0	114.3	127.7

Source: *Zhongguo tongji nianjian 1994*, 232.

the problem of unemployment was further aggravated. In addition, the reform of state-run enterprises in recent years has caused the bankruptcy or closing-down of certain enterprises with no positive achievements, leading to unemployment and strikes. Floods have caused even more factories to shut down or stop production. When enterprises with sound structures are forced to stop or decrease their production, mishandling of the situation can create a large group of unemployed workers. Combined with the farmers who moved from flood-stricken villages, the scale of *mangliu* (the blind flow) has enlarged, complicating the problem and affecting social security and stability.

Conclusion

In recent years, frequently occurring natural disasters have dealt a great blow to mainland China. Reducing disasters has been a key task in the Ninth Five-Year Plan. It is expected that in the year 2000, the plan will lower the immediate economic loss caused by natural disasters to below 10 percent.

Nevertheless, disaster reduction is a long-term, continuous task because the damaged environment, which in turn invites further natural disasters, cannot be restored in a short term, or may never recover at all. The effects of repairing the environment will not be seen in a short period of time; however, the problem mainland China faces is pressing and cannot be neglected. "No grain, no stability" has been the CCP's experience during its rule on the mainland. In 1994, owing to disasters, grain production was less than that in 1993, with demand outweighing supply by 0.5 million tons. According to the State Statistics Bureau's preliminary estimate, because of several factors, including a growing population, the demand for grain in 1995 would exceed 455 million tons, 10.5 million tons more than 1994's total production. The estimated shortage is 40 billion *jin*. Since there were more severe floods in 1995 than the previous year, it would be fortunate enough to maintain 1994's level of grain production, yet shortage will definitely exceed the estimated 40 billion *jin*.

In the PRC's plan, the goal of 500 million tons of total grain production should be reached by the year 2000. However, from a practical point of view, for grain production to increase from 444.5 million tons in 1994 to 500 million tons in 2000, the annual growth must be 9.25 billion kilograms, a rate of 2 percent. However, between 1984 and 1994, annual growth has only been 3.5 billion kilograms, or a rate of 0.9 percent. Even if the goal of 500 million tons is reached in 2000, the mainland's population at that time will have increased to an estimated 1.294 billion. The output per capita would be no more than 386 kilograms, still falling short of 1984's standard.

Four hundred kilograms of grain per capita is a minimum standard for basic living. However, this modest goal has not even been fulfilled. Once the vast unemployed and starved people pass the point of endurance, mainland China will face its most severe test ever.