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A STUDY ON THE ECONOMIC BENEFITS IN DEVELOPMENT OF FRESHWATER FARMING

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Abstract: China, with the largest population in the world, has most of its people living in the rural areas. How to boost the rural economy further is a key factor to the rapid development of the national economy. The author shows with many examples that the development of freshwater farming has considerable economic benefits and thus can facilitate the modernization of the Chinese rural areas.

Key words: freshwater farming, economic benefits
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INTRODUCTION

Since 1978, China's fishery industry has witnessed a rapid development and annual growth of 12% rise. The output of aquatic products has been top ranking in the world for 12 running years since 1988 when China surpassed Japan in 1998. Last year's output amounted to 41 million tons (National Statistics Bureau, 2000), accounting for over 1/3 of the world's total. Such remarkable development has made the shortage of supply of aquatic products remote history. On a per capita basis, the Chinese now have 32.56 kg aquatic products; while in 1980, they had only 4.4 kg. (International Trade News, 1998) A craze in breeding fishes has emerged across China and the output of freshwater products has been on a steady rise: from 762 thousand tons in 1978 to about 11 million tons in 1996, an increase of 14.4 times. Besides, the proportion of cultured freshwater products to total freshwater products has increased from 72.09% in 1978 to 86.18% in 1996(see Table 1). Thus, China's aquaculture industry plays a significant role in the world, with output accounting for 55%, and freshwater farming output accounting for 68%, of the world total in 1998. With the development of science and technology in the fishery industry, the freshwater farming output per hectare increased from 315 kg in 1980 to 2 167 kg in 1996 and the pond raising output per hectare increased from 750 kg to 4 096 kg.

Table 1 Artificial raising output of freshwater products (1978 – 1996)[a] unit: 1000 tons

Year	Freshwater product output (1)	Artificial breeding product output (2)	(2)/(1) %	Year	Freshwater product output (1)	Artificial breeding product output (2)	(2)/(1) %
1978	1057.0	762.0	72.09	1990	5237.0	4454.0	85.05
1980	1239.9	900.2	72.60	1991	5507.0	4592.0	83.38
1983	2854.1	2377.7	83.31	1992	6234.0	5334.0	85.56
1985	3482.0	2944.0	84.55	1993	7469.6	6441.1	86.23
1987	4072.0	3472.0	85.27	1994	9016.2	9016.2	87.07
1988	4552.0	3898.0	85.63	1995	10780.5	9407.6	87.26
1989	4905.0	4170.0	85.02	1996	12752.0	10989.5	86.18

[a] Source: China Statistics Yearbook

THE SITUATION OF FRESHWATER FARMING IN CHINA

1. The main forms of freshwater farming

Pond farming: Pond farming has always been an important sideline in China's rural areas and a main form of freshwater farming. The ponds for fish farming across the country covered 1 959 800 ha in 1996, comprising 40.34% of the total available culture water area and with 8 027 300 tons of yield. From 1983 to 1996, culture pond area increased to 995 133 ha and the output to 699 730 000 tons.

Lake and river farming: The lake and river areas for fish farming increased from 817 333 ha in 1983 to 2 405 800 ha in 1996 with average annual increase of 113 460 ha. Lake and river farming in China has great potential for expansion, not only because there are many lakes and rivers (most of them are medium-sized or small-sized) but there is still a large water area of lakes and rivers available.

Reservoir farming: The history of farming in reservoirs can be traced back to Dongqian Lake in Zhejiang Province. In 1950, a state-owned fish farm was established on it. At present, there are over 38 600 reservoirs in China covering 2 054 667 ha, of which 1 820 000 ha are available for aquaculture. In 1983 the aquaculture area was 1 298 267 ha, accounting for 42% of the total area for freshwater aquaculture, and the output reached 149 000 tons, 10.4% of the gross aquaculture output of the year respectively. (Fishery Industry Economy Association of China, 1983) However, the farming area dropped to 368 832 ha in 1996 and the present utilization is only 20%.

Rice field farming: Fish farming in rice fields has become the new growth point for the China's freshwater farming industry. There are 0.1 billion ha rice fields available for fish raising in China. As early as 1 700 years ago, China started raising fishes in rice fields. In recent years, China has witnessed rapid development in raising fishes in rice fields and in 1997 the farming area and output increased by 58% and 138% over 1994 respectively (Table 2). This practice can help farmers get rid of poverty. We can take Jiangsu Province as the example. In the past three years, the rice field area has increased by 13 333 ha and the output of grain and aquatic products increased by 100 000 tons and 12 500 tons respectively. The increase of the output value and profit was 0.675 and 0.325 billion yuan respectively (Sun, 1993).

Table 2 Rice field fish farming output in China (1994 – 1997)

	1994	1995	1996	1997
Farming area (10 000 ha)	105	103	145	167
Output (10 000 tons)	21	27.29	38	50

2. The development of WSH (well-known, special, high-quality) freshwater products

Improvement of the living standards accelerated a demand for more and more highly nutritious WSH aquatic products, such as turtle, eel and crocker; while the demand for four domestic carp (silver carp, variegated carp, black carp and grass carp) is also on the rise. WSH farming gives strong impetus essential for the development of the freshwater farming industry. As a new economic growth point, WSH raising will ensure the sustainability of China's freshwater farming industry.

Turtle raising: Turtle has high nutritional pharmaceutical value, so its raising yields fairly high economic return. China has an 18-year turtle raising history. With the development of technology and expansion of farming size, the output has been rising steadily from 945 tons in 1992 to about 40 000 tons in 1997. It was estimated that it will increase to 100 000 tons in 2000 (Zhu, 1998). The output of 1997 was 39 055 tons more than that of 1992, an increase of 4232.8% The average annual increase from what year to what year? was 705.5%. China's fishery industry has never witnessed such a rapid development before (Wang, 1998) (Table 3).

Table 3 Turtle output in China (1992 – 1997)

	1992	1993	1994	1995	1996	1997
Output(tons)	945	1472	9360	17445	32004	~40000

Eel raising: Eel (Japanese eel mostly) raising began in the early 70s. In recent years, breeding European eels has become popular, partly because of the unsteady supply and high price of the Japanese eel fry and the compara-

tively higher profit in breeding European eels. Raising eels is subject to relatively frequent price fluctuations both at home and abroad. 1993 was a prosperous year in eel raising, when the farming area was 8 888 ha and the output about 80 000 tons(Youfei Cai, 1998), valued at more than 5 billion yuan. In that year, the highest price for a ton of eel was over 200 000 yuan (Jingde Jia, 1994); but in recent years, it has dropped to 40 000 – 50 000 yuan per ton, although it is estimated to rise gradually. The eel output reached to about 100 000 tons in 1998, accounting for half of the total output of the world with yearly eel demand of about 200 000 tons.

River crab raising: Since the 90s, river crab raising in China has undergone some distinctive stages: from coarse to refined, from large water area to small area, from mixed raising of crabs and fishes to farming crabs in rice fields. The development scale, expansion size, economic returns and rising popularity are incomparable in China's history. As a result, river crab raising is moving toward industrialization. In recent years, the output of river crab has been increasing by 20 000 tons annually. The output of river crab was 17 500 tons in 1993, 80 000 tons in 1997, an increase of 460%(Wu, 1998)(Table 4).

Table 4 River crab output in China (1992 – 1997)

	1993	1994	1995	1996	1997
Output (tons)	17500	31200	41500	60000	80000

ANALYSIS OF THE ECONOMIC RETURNS OF DEVELOPING FRESHWATER FARMING

The rapid development of freshwater farming will bring great economic benefits and be a boom to the national economy.

1. Increasing the grain output

The issue of grain is a national concern and the development of freshwater farming can increase the grain output directly and indirectly. For example, breeding of fishes in rice fields, raises the grain output by 10%. In 1997, China's rice fields for fish farming covered 166 667 ha; the direct increase of grain output was 1.25 billion kg. We can get more animal protein with less vegetable protein by fish farming, since most fishes do need to feed on grain (some fad on plankton in the water). As to predacious fishes, they consume less feed grain than other animals.

2. Health-care effect

Aquatic products have high nutrition value. They can relieve people from illnesses, improve their health, make them live longer, etc. so many of aquatic products are termed health-care food. In Oct. 10, 1990, a renowned British scientists, in a symposium in Tokyo, Japan, put forward the idea that consumption of fishes might be beneficial to brains. He believes that DHA, a highly unsaturated fatty acid, is essential to neural transmission in the brain; that DHA also plays an important role in one's judgment, concentration and sensitivity; and that short supply of DHA will cause the decline of memory power. DHA is usually lacking in everyday diet ranging from pork, mutton, beef and beans to vegetables. Aquatic products, such as fishes, comprise the major source of DHA.

3. Attracting surplus rural laborers and increasing income of farmers

The rural areas in China have abundant labor resource; but because of the backward economy and low income of the majority of the farmers, it is an arduous task to relieve the rural areas from poverty. In recent years, the development of freshwater farming has created many jobs, increased income for farmers and thus improved their living standards. The gross national output of the fishery industry was about 111.2 billion yuan in 1995 and the fisherman's average net income was 3 352 yuan, 1 774 yuan more than the farmer's average net income on a national basis.

4. Storing water in reserve against droughts and preventing losses from floods and droughts

The Changjiang River flood in the summer of 1998 caused great loss to the Chinese people. Disaster taught people that efforts must be made to construct water conservancy projects and to protect the natural environment and ecology. Developing freshwater fish farming, especially in ponds, lakes and reservoirs can effectively mitigate the harmful effect caused by droughts and

floods. The ponds and lakes can store surplus water in times of flood to reduce the risk of flooding of farms; while in times of drought, the water in reservoirs, ponds and lakes can be used for irrigation. What is more, developing freshwater farming also contributes to ecological and environmental protection. For example, after grass carps were raised in rice fields, the weeding rate was 86.7%; while in the case of mature carps, it was as high as 89.6%. The substitution of the practice of breeding fishes in rice fields for chemical weeding methods has greatly reduced pollution of water and farm produce.

5. Ensuring market supply

Developing freshwater farming can ensure market supply and price control when sea products decline. Basically, the production and marketing sites of freshwater fishes are not far apart; thus living fishes can be marketed throughout the year to meet the needs of most of the consumers. Besides, it is convenient for farmers to adjust production according to market changes. For example, when supply is more than demand, they may fish less. Conversely, when supply is less than demand, they may fish more to satisfy consumers and control market price.

CONCLUSIONS

To sum up, to quicken the development of freshwater farming is an important task for China today. With the rapid expansion of the world population, we need more and more grain to solve the problem of feeding. Besides, the output of sea products, which was formerly the main source of aquatic products, is declining sharply because of over harvesting worldwide. Under these circumstances, the development of freshwater farming seems to be a strategic option. We should give first priority to developing freshwater farming in China.

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