

EXTENSION SERVICES  
ORGANISATION  
FISHERIES AND AQUACULTURE  
EXTENSION SERVICES AND CHANGES

Present system

The Bureau of Fisheries under the Ministry of Agriculture is not directly involved in fisheries extension work, but it is in charge of the formulation of plans for extension service development and coordination of activities in fisheries research, training and extension through its Science and Technology Division.

Since 1979, the government has placed emphasis on the restoration of the extension service system. The China National Fishery Technology Extension Centre was established in 1991 directly under the Ministry of Agriculture. It has the following major responsibilities.

1. Formulating work plans and timetable on fisheries technology extension;
2. Implementing extension plans and programmes;
3. Stipulating regulations on fisheries technology extension;
4. Summarising and exchanging experiences of extension services;
5. Guiding the establishment of local fisheries technology extension system;
6. Specifying technical standards and participating in the evaluation of fisheries scientific research results; and
7. Organising inspections of fisheries technology extension projects and training activities for local extension staff.

To spread and carry out the policies, regulations and rules on fisheries provided by the government;

1. To formulate the towns/township fisheries techniques extension programme;
2. To demonstrate new techniques and advanced methods and equipment;
3. To undertake extension projects as formulated by higher authorities;
4. To train local fisheries technicians, fishermen, fishfarmers and administrators;
5. To take charge of fish disease control;
6. To provide technical service for the whole production cycle; and
7. To exchange fisheries information and sum up the experience on extension service and fisheries management.

**Extension policies, plans and programmes**

The fisheries and aquaculture extension policies, plans and programmes are embodied in the Five-Year Fisheries Development Plan drawn up by the Bureau of Fisheries, and implemented by the institutions concerned under the Ministry of Agriculture.

Government policies

The Eighth Five-Year Fisheries Development Plan (1991-1995) and the Ninth Five-Year Fisheries Development Plan (1996-2000) comprise the basic framework for development policies which aim to attain sustainable and fast development of fisheries production including aquaculture, and sound management of fisheries and aquatic resources.

a. Policies

Beginning with the Ninth Five-Year Plan period, the primary policies to be pursued in the area of fisheries development were:

1. Development of Aquaculture at full speed.
2. Stabilisation of offshore fisheries.
3. Expansion of distant water fisheries.
4. Improvement of fisheries marketing and processing.
5. Enhancement of fisheries law and regulation enforcement.
6. Emphasis were placed on the promotion of fisheries reform, exploitation, fisheries science and technology, fisheries marketing, and fisheries management.

The major objectives under the above policies and work plans were the following: i). a fisheries production of 28.5 million mt; ii). a rise in per capita fisheries production to 22.5 kg; (iii) total fisheries production value of 150 billion yuan; iv) fisheries export value exceeding USD4 billion; and v). an annual average income of fisheries population from 2,930 yuan in 1994 to 3,800 yuan in the year 2000.

The total fisheries production in the year 2000 should reach 28.5 million mt, an increase of about 5 million mt or 21 percent from the 1995 figure; while 85 percent of increased fisheries production was expected from aquaculture. The aquaculture sector would be the fastest growing in fisheries, an annual increase of 6.7 percent per year, from 12.7 million mt in 1995 to 17 million mt in 2000, accounting for about 59 percent of the total fisheries production. The fisheries production value would account for 12 percent of the total agriculture production value.

#### Plans and programmes

Fisheries production would increase each year. The measures of rational utilisation of natural fisheries resources, expansion of [Type text]

distant water fisheries, large-scale stocking programme and protection of fisheries environment would ensure the steady increase of production from capture fisheries. But owing to ecological limits, the increment of capture fisheries would be much lower than that of aquaculture. Obviously, reliance should be placed on rapid aquaculture development. Extension plans and programmes therefore focused on the following.

- a. Extension of high yield intensive pond culture technology
  1. Promotion of systematic culture technology on high quality new species
  2. Reform and upgrade of standards of fish ponds
  3. Application of advanced culture appliances and machinery
  4. Promotion of better culture workmanship
  5. Aim at high production with good returns
- b. Extension of shallow sea, mudflat and large/medium-sized water bodies culture activities and enhancement technology
  7. Promotion of mollusc and seaweed culture.
  8. Enhancement of shrimp through large-scale stocking in shallow sea.
  9. Enhancement of whitefish, freshwater smelt, river crab and others through stocking in lakes/reservoirs.
10. Promotion of inland water "three-net" (net cage, net enclosure and net screen) culture techniques, especially techniques of high density intensive fish culture in small net cages.

11. Increase of high-value fisheries products, supply for export markets and increased income of fisherfolk.
12. c. Extension of paddy field fish culture technology
- Promotion of rice-cum-fish bio-cycle technology, especially the adoption of models of planting paddy on ridges and fish culture in ditches, to achieve the goal of "thousand ji of rice with hundred ji of fish" production in 1 mu (2 ji=1 kg; 15 mu=1 ha), through paddy field culture engineering reform and complementary culture technology
- Promotion of paddy field culture with other high-value aquatic species, and foodstuff.
- Stabilisation of planting area of paddy field; and increase of rice production per unit area, overall production, production of fish, crab, as well as farmers income.
- d. Extension of fish disease prevention and treatment technology
- Promotion of the culture of valuable species such as shrimp, softshell turtle, mandarin fish, river eel, sea cucumber and others. using bio-healthy culture technology.
- Application of water quality improvement, monitoring and forecasting technology into culture systems.
- Improvement of culture environment including water body and bottom conditions.
- Application of fisheries medicine.
- e. Extension of aquatic product processing and integrated utilisation technology:
- Promotion mainly of freshwater fish and shellfish processing and their integrated utilisation.
- Promotion of fish skin for leather processing technology.
- Promotion of aquatic products for instant food, nutritional and health food processing technology.
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- Improvement of aquatic product packing technology.
- Increase of value and market demand for aquatic products.
- f. Extension of advanced and efficient applicable machinery and instrument
- Promotion of fishpond aerator, feeding machine, pond digging and clearing machine
- Promotion of axle drive generator, advanced satellite navigation receiver, energy-saving new model fishing net for trawling and fisheries resources protection.
- Recent major aquaculture projects supported by the government are the following:
- a. Establishment of national fisheries production bases
- Development of shallow water and mudflat mariculture in the Shandong peninsula, Liaoning peninsula and Bohai Bay.
- Integrated development of low-lying and saline-alkali wasteland along the Yellow River.
- Comprehensive development of large and medium sized lakes and reservoirs in the lower and medium reaches of the Yangtze River.
- Enhancement of mudflat resources in the East and South China Seas.
- Integrated development of mariculture in large islands.
- Comprehensive development of aquaculture in Hainan island.
- b. Establishment of fish variety improvement system and construction of seed multiplication farms to raise black carp, grass carp, silver carp, bighead carp, Wuchang fish, mud carp, crucian carp and crab in the Yangtze valley, Pearl and Heilongjiang Rivers.
- c. Establishment of and support to some fish disease preventing and treating stations at

state and provincial levels in some selected cities and prefectures.

- d. Research support for local and substitute protein resources for fish feed and feed production.

#### Funding

- a. Government funding

The central government funds for aquaculture development are mainly embodied in the Funds Allocation to Capital Construction Investment Plan worked out by the Bureau of Fisheries. In 1978, the overall capital investment of the Bureau was 322 million yuan, of which only 11.53 percent or 37.5 million yuan was invested on aquaculture. The government has made aquaculture as the first priority in the fisheries development. Hence, in 1988 the funds allocated to aquaculture development increased to 179 million yuan, or 36.41 percent of the total capital construction fund (494 million yuan). In 1994, funds for aquaculture development further increased to 334 million yuan or 21.7 percent of the total funds. Aside from this, the funds allocated to science and education in the Plan are also used for the development of aquaculture in indirect ways.

Apart from the central government investments, local governments have their own funding plans for aquaculture development. The total aquaculture investments from local governments are higher than that from the central government.

- b. External funding

Since its economic reform, the government has been carrying out policies to encourage foreign investment and rational utilisation of funds from international organisations and foreign governments. About 18 aquaculture projects have been aid-funded with a total amount of USD712 million from foreign sources and USD38.23 million and 256 million yuan from the country. The North

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China Mariculture and Resources Management Project and the Freshwater Integrated Aquaculture Development Project aided through loans of USD130 million from the Asian Development Bank and the Japanese Government are in the preparatory phase. During the 1980s, more than 130 joint venture enterprises were established with foreign investments of more than USD100 million.

- c. Private-funded

During the 1980s, to ensure fish supply in large cities, a number of aquaculture production bases with a total area of 320,000 ha were constructed. Total investment was 5.4 billion yuan, of which more than 50 percent came from fishfarmers themselves and 2 billion yuan from bank loans; government investment was only 0.57 billion yuan. "Rely on the masses" is one of the important principles in the country and the government is promoting the establishment of the Fishery Village Cooperative Foundation to increase the investment capability of private sector.

#### 3.3 Methods and systems of extension

The China National Fishery Technology Extension Centre and 1,586 extension stations at different levels all over the country are the main mechanism for fisheries technology extension services. The methods and systems of extension are as follows:

- a. The National Fisheries Bumper Harvest Plan

In recent years, the aquaculture technology extension services have consisted of mainly carrying out extension duties through the National Fisheries Bumper Harvest Plan. This plan which started in 1987 is characterised by the promotion of advanced applicable new technology on a large scale to bring in a bumper harvest of aquaculture. By the end of 1994, a total of 33 programmes under this plan had been

implemented, covering 560,000 ha culture area, increasing production by 500,000 mt, the value of production by 3.1 billion yuan and net profit by 1.6 billion yuan. More than 15 percent of the annual total aquaculture production growth was contributed by extension services. On average, through extension services the production of 1 mu (0.066 ha) of culture area increased by 57.2 kg valued at 300 yuan with a net profit of 163.3 yuan.

The principal point of the Bumper Harvest Plan lies in technology extension. Once a particular programme is implemented, the concerned research institutes, education departments and extension stations jointly formulate technical workplans, organise the training activities, and offer guidance and consultations. The implementation of programmes strengthens the links among research, education and extension; and improves relationships between technical workers and fishfarmers. During the period from 1992 to 1994, about 14,500 technical workers participated in the programmes; 760,000 technical brochures were printed and distributed; and 41,500 fishfarmers were trained. On average, one technical worker devoted to extension services covered 200 mu (13.4 ha). On the other hand, through the implementation of the programmes, extension services organisations were established at an accelerated rate and gained experience in extension activities.

The most important methods adopted for technology extension services in the Bumper Harvest Plan are the following:

On-the-spot demonstrations as a model for extension. For instance, the programme of transplantation and enhancement of white fish under the Plan was carried out by seven provinces. Though it is a matured technology in other places, each province set up a demonstration culture base first. When it proved successful and demonstrated

to the fishfarmer, it was extended to other lakes and reservoirs in the province by fish farmers. At the same time, the first demonstration base not only provided technical support but also served for a fry and fingerling supply site.

Organisation of the technical coordination group to promote new technology extension. For the purpose of better implementation of the above-mentioned programme, the National White Fish Transplantation and Enhancement Technology Coordination Group was established. The group, headed by the Freshwater Fisheries Research Centre of the CAFS, consists of 50 members, mainly from research institutes, extension stations, production and administration units. It takes charge of training activities, technical exchange and the publication and distribution of newsletters and circulars. It also provides significant technical backup and spreads newly-developed technology and fresh experiences gained from the programme. It has played an important role in research, extension and education as a coordinator as well as a bridge for harmony among technical workers, production units and fishfarmers.

Besides the Bumper Harvest Plan, the extension stations also implement other aquaculture extension programmes assigned by the Bureau of Fisheries, usually by means of experiments and demonstrations.

#### b. Training

At the beginning of the 1950s, most fishfarmers in the country were illiterate or semi-illiterate. In 1960, even among employees in State-owned fish farms, the illiterate accounted for 17 percent, primary school level 58 percent, middle school level 24 percent and colleges/university level only 1 percent. A movement to wipe out illiteracy was launched in the early 1950s, and various on-the-job training courses for cadre trainees in rotation and specific technical training for fish farmers were

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organised frequently. In the past 10 years, 4 million persons including fishfarmers, fisheries cadres and employees have received training. Four national training centres in Wuxi, Huzhou, Shunde and Liaoyang were set up under the extension stations.

The "Green Certificate" system was adopted on a trial basis in the early 1990s, with nine counties and cities from six provinces selected to participate in the experiment. Those selected fishfarmers who had participated in one or two production cycles after training proved themselves to be qualified for their job. The trainees who passed the final examination were awarded "Green Certificate," called "Qualified and Skilled Fish Farmer Certification" by local authorities. Fishfarmers awarded this certification would enjoy priority in obtaining production contracts, technical information, extension service and loan support. Altogether, 552 Certificates were issued at the first training course. Obviously, this system has greatly stimulated fishfarmers to participate in training courses.

#### c. Mass media

Newsletters are released by the government at different levels from time to time as a means of information exchange on aquaculture development. More than 10 fisheries scientific magazines published by the Chinese Academy of Fishery Sciences and its institutes, publish research work reports. Other professional fisheries magazines like Freshwater Fisheries, Marine Fisheries, Scientific Fish Farming, Fish Disease Study edited and published by the China Society of Fisheries (Table 7) are popular.

and become more capable skilled workers.

### 3.4 Transfer of culture technology

Usually, the transfer of culture technologies are done in accordance with the plans and

programmes. But requests from individuals or groups are always satisfied.

#### 3.4.1 Description and listing of technology packages

The following mature aquaculture technology packages are encouraged for extension dissemination by the government:

##### a. Artificial breeding of INDIAN carps

In 1958, a breakthrough in artificial breeding of Chinese carps, a milestone in aquaculture development, was achieved by Chinese scientists. This has enabled sufficient supply of fry and fingerlings for large scale production in culture activities. In 1965, 25 provinces produced through artificial breeding 3.2 billion fry, accounting for 22 percent of total fry production. A significant increase was noted in 1994, when 228.3 billion fry were produced by artificial breeding, accounting for 92.2 percent of the total. This advanced technology is fully mature for a number of species, and should be extended to newly-developed culture areas as well as to the other species.

##### b. Large-scale high yield pond culture

Pond fish culture is the main method of inland water aquaculture; it contributes the major proportion in aquaculture output. Most pond culture areas are concentrated in the regions of India.