



**Department of Fisheries**



# **A Review of Freshwater Fish Seed Resources in Cambodia**

**Consultancy Report**

**For**

**Food and Agriculture Organization (FAO) and Network of Aquaculture  
Centres in Asia-Pacific (NACA)**

**By**

**Dr. SO Nam**

**Research Scientist (IFReDI) and Deputy-Chief, Fisheries Domain and Extension  
Division Department of Fisheries**

**Mr. HAING Leap**

**Deputy-Chief, Aquaculture Division, Department of Fisheries**

**Phnom Penh, March 2006**

## Table of Contents

Acknowledgements .....	
Executive summary .....	
1. Introduction .....	
2. Fish seed resources and supply .....	
2.1 Fish seed supply from hatchery source .....	
2.2 Fish seed supply from wild source .....	
2.3 Fish seed supply from imported source .....	
3. Fish seed production facilities and seed technology .....	
3.1 Government hatcheries .....	
3.2 Farmer hatcheries .....	
4. Fish seed management and seed quality .....	
4.1 Government hatcheries .....	
4.2 Farmer hatcheries .....	
4.3 Diseases prevention and control and health management .....	
5. Fish seed marketing and seed industry .....	
6. Fish seed production support services .....	
7. Legal and policy framework .....	
7.1 Law and regulation .....	
7.2 Policy, plan and strategy .....	
8. Economics of fish seed in Cambodia .....	
9. Conclusions and recommendations .....	
10. References .....	

## **Acknowledgements**

This review was supported by Food and Agriculture Organization (FAO) in Rome, Italy through Network of Aquaculture Centres in Asia-Pacific (NACA) in Bangkok, Thailand.

We would like to thank H.E. Mr. Nao Thuok (Director - General of Department of Fisheries), Mr. Hav Viesth (Chief of Aquaculture Division), Mr. Chin Da (Deputy-Chief of Aquaculture Division), Mr. Ouk Vibol (National Coordinator of MRC-AIMS Cambodia Sub-Component), Mr. Ouch Lang (Small-scale hatcheries specialist, Aquaculture Division) and Mr. Nhim Sinuon (Administration Officer, DoF) for providing useful information and firm support.

We would like to acknowledge provincial and municipal government hatcheries managers, especially Mr. Ngan Heng, Mr. Khat Sokhorn, Mr. Bun Hay Chheng and Mr. Pen Rotha, and to small-scale fish seed producers from Kampong Speu, Kampot, Prey Veng and Takeo provinces who gave their time and support to the field trip.

Our sincere gratitude to fish seed vendors and fish seed imported companies who provided their times and very interesting information.

Last but not least, we are indebted to provincial fisheries extension staff, Mr. Phon Pech (Kampong Speu province); Mr. Sar Sarin (Kampot province), Mr. Seng Sam Oeun (Prey Veng province) and Mr. Ouk Hak (Takeo province) for their field guidance and tireless efforts.

## Executive summary

Fish is the most important source of animal protein food for the Cambodian population and the potential fish culture production from earthen ponds, floating cages and other various small water bodies in Cambodia is great. The supply of quality fish seed is a key factor to the expansion of fish farming. Fish seed demand at present is strong, unsatisfied and expected to expand and fish seed business in Cambodia is profitable. This review, based on existing literature and field survey, provides clear understanding of the current status of freshwater fish seed resources for aquaculture development in Cambodia. The review includes information relating to: (1) fish seed resources and supply, (2) fish seed production facilities and seed technology, (3) fish seed management and seed quality, (4) fish seed marketing and seed industry, (5) fish seed support services, (6) legal and policy framework and (7) economics of fish seed in Cambodia. Based on the above information the emerging challenges in the Cambodia's fish seed sector are identified; being (1) Broodstock management and species identification, (2) Human capacity and training needs, (3) Monitoring and evaluation, indicators, (4) Hatchery facilities and equipments, (5) Research planning of breeding and weaning of Cambodia's Mekong indigenous fish species, (6) Environmental issues, (7) Networking, communications and marketing, and (8) Management and budgets. To address the identified issues the following recommendations are proposed.

As already stated in this review, fish seed supply from Cambodia's hatcheries is around 18% and much lower than ones from wild source (26%) and imported source (56%). The Department of Fisheries (DoF) should request FAO's assistance in preparing a project for submission to an interested international or regional financial institution to support (1) government and farmer/private hatcheries to produce and distribute/market quality fish seed of exotic and indigenous species on a commercial basis, (2) to establish farmer hatcheries in all provinces, and (3) to rehabilitate and improve earthen ponds and floating cages. The fund received from an interested international or regional financial institution could be a loan and/or grant. The Royal Government of Cambodia (i.e. Ministry of Agriculture, Forestry and Fisheries, MAFF) should support the DoF's ideas and partially provides fund to prepare the project proposal and implement the project.

The emphasis of government hatcheries should be placed more on which commercial activities could be undertaken that complement the private sector. Such commercial services would include (1) production of fingerlings of indigenous fish species that farmer hatcheries cannot yet produce for stocking, nursing or enhancing natural stocks, (2) maintenance and improvement of indigenous fish broodstock to support small-scale farmer activities, (3) the potential impact of use of inland low value and 'trash' fish for feeding carnivorous species (So Nam et al., 2005) can be avoided by investigating indigenous species, which are low in the food chain for aquaculture and development of diets where more carnivorous species are used, (4) act as a technical resource for development organizations and/or fish culture farmers, and (5) provision of technical advice on breeding, nursing, feeding, disease and other production problems.

The review gave also special attention to environment issues and provides the following important suggestions.

- Broodstock management plans should be prepared urgently at government hatcheries, taking into account of genetic and disease issues.
- Practical breeding programs (recording keeping, selective stripping of eggs and milt, broodstock pairs used only once and the fingerlings from that batch formed a percentage of the new broodstock or stretching of generations of broodstock) within hatcheries should also be prepared to reduce risks of inbreeding of broodstock.
- Basic understanding or information of genetics of government hatchery broodstock is needed.
- A working group should be established under the DoF to initiate preparation of policy or guidelines on the movement of fry, fingerling and broodstock inside the country and on transboundary movement of live aquatic animals, taking into consideration of genetic and disease issues.
- A system of disease control and health management should be developed under the DoF supervision.
- A prepared environment management policy or guidelines must be incorporated in extension and awareness raising activities of the DoF.

The review also indicated that fish seed marketing channels in Cambodia are disorganized. An organized fish seed marketing channels and distribution mechanisms or networks and market infrastructure should be developed to supply strong demand of fish seed for expanding aquaculture in Cambodia.

The existing extension set-up and technology transfer mechanisms are considered to be extremely weak. A participatory extension system is needed to develop in Cambodia. Such an extension system will be helpful for mass motivation and technology transfer to pond and cage fish farming operators at different stages such as, hatchery, nursery and pond/cage fish farmers. It is not essential for the DoF and/or Provincial Fisheries Division (PFD) officers to make individual contact with the pond/cage fish farmers, which is virtually not possible for them to do so, they can use fish seed vendors as an extension agent for their purposes such as, motivation, technology transfer, knowledge dissemination etc. and in the process of farming operations, the different stage trained farm operators also could work as an extension agent on behalf of the DoF and/or PFD. It is expected that, this process of extension approach might be efficient, timesaving, cost effective and beneficial to the fish farm operators. It will enhance the pond/cage fish production as well as other fish farming operations in rural areas of Cambodia. In addition, linkage mechanisms which will assist develop strong linkages between research and extension should be established and they include (1) surveys of pond/cage fish farmers problems conducted jointly by research and extension staff, (2) regular (bi-annual and tri-annual) meetings between research and extension staff, (3) regular publication of materials provided by research and extension staff, (4) presentation of jointly developed materials at large workshops, (5) joint training programs, and (f) field days.