

# **PRINCIPLES AND PRACTICES OF HIGH DENSITY FISH CULTURE IN LOW VOLUME CAGES**

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## PREFACE

This revision of the 1993 low-volume, high-density (LVHD) cage fish culture manuals was undertaken largely in response to the demand from the rapidly expanding freshwater cage fish culture industry in the People's Republic of China. The China freshwater aquaculture industry as a whole has grown from a modest contributor to national food production in 1980 (<0.9 mmt production) to an industry of global proportions in 1996 (10.94 mmt valued at \$10.58 billion).

Cage culture has become an increasingly important sector of this industry, and significant opportunities exist for continued expansion of cage culture in regions of China that have under-utilized natural and man-made reservoirs, lakes, ponds and other catchments. Upon completion, the Three Gorges Reservoir in Sichuan Province will impound an estimated 67,000 hectares with a cage production potential of nearly 20 million kilograms.

In addition to freshwater cage culture, the LVHD system has also shown to be effective in both brackish- and saltwater environments. As the amount of marine fish caught from the wild either stabilizes or declines, increases in demand for marine species will be at least partly met through cage culture.

The ASA has now gathered more than ten years of experience with demonstrations and feeding trials in China, and based on these very successful experiences a new program was initiated in India and Southeast Asia in 2003, called the Soy-In-Aquaculture program. Working with local farmers, feed mills, and universities, the LVHD technologies developed in China are being introduced into these regions.

India and Southeast Asia have strong and growing aquaculture industries. The four target nations of the Soy-In-Aquaculture program - India, Indonesia, Vietnam, and the Philippines - all rank in the top ten of the aquaculture producing countries in the world with over 4.6 mmt of production annually. The American Soybean Association recognizes the region's growing aquaculture industry and the opportunities to aid farmers and feedmills with advanced technologies.

The Soy-In-Aquaculture program aims to realize similar outcomes as the LVHD program has demonstrated in China. The program focuses on the acceleration of the adoption of more profitable and environmentally sound technology and the associated growth of the aquafeed industry in Southeast Asia and India.

This manual has been prepared as a practical guide for aquaculture production, extension and associated industry personnel involved with the culture of fish in cages. It presents principles and technologies for production of fish in LVHD cages as a technically and economically viable alternative to other fish culture systems, particularly traditional cage systems that rely on high cage volume and low fish density. The manual emphasizes the four key elements of successful fish culture in today's market driven economy – quality stock, water, feed and management. A set of reference guidelines for culturing fish in LVHD cages is included as the final chapter of the manual.

We would like to thank the tremendous number of fish farmers, government officials, researchers and industry personnel who have contributed to this manual through their

combined and freely shared effort, experience and support for cage fish farming. Special acknowledgement is given to Drs. Claude Boyd, Tom Lovell and John Plumb of the Auburn University Department of Fisheries & Allied Aquacultures of their many personal and technical references in water quality, fish nutrition and fish health. Lastly, we are especially grateful to the soybean producers of the United States, the United Soybean Board, United States Department of Agriculture Foreign Agriculture Service, and the American Soybean Association whose foresight and vision in international market development have supported training and demonstration of LVHD technologies in China and the preparation and publication of this manual.

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