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# Marine Shrimp Culture Industry of Thailand

## Operating Guidelines for Shrimp Farms

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### 1. THE CODE OF CONDUCT

#### Introduction

The marine shrimp industry in Thailand had developed a code of conduct for its operations. This code of conduct is a set of principles and processes that provides a framework to meet the industry's goal for environmental, social, and economic responsibility. The foundation of the code of conduct is the following mission statement.

The marine shrimp farming industry in Thailand is committed to producing high quality, hygienic products in a sustainable manner that provides for environmental, social, and economic benefits for the present and future generations.

Policy statements have been formulated to outline actions that the industry will undertake to meet its commitments under the mission statement. These policy statements cover a broad range of topics, including:

Environmental protection	Public consultation
Regulatory compliance	Location
Quality and safety	Continual improvement
Efficiency	Research and development
Social responsibility	Monitoring and auditing
Education and training	International trade

The code of conduct is voluntary, but it has been signed by a wide variety of industry stakeholders. The code commits the signatories to specific actions, including the development of a series of operating guidelines and procedural manuals. These actions will aid the industry in carrying out its operations in a manner consistent with the objectives of the code of conduct.

#### 2. Operating Guideline and Procedural Manuals

This is the first in a series of operating guidelines and procedural manuals developed for the marine shrimp culture industry of Thailand. In particular, manuals covering the following sectors of the industry have been developed:

- Volume 1 - Shrimp Farms
- Volume 2 - Hatcheries and Broodstock Capture
- Volume 3 - Processing Facilities
- Volume 4 - Feeds and Chemical Suppliers

The objective of the operating guidelines and procedural manuals is to promote consistent approach to industry operations through through establishment of good management practices or GMPs. It is anticipated that the implementation of these GMPs, will enable the industry to operate in a sustainable manner.

### 3. Good Management Practices

Good management practices are defined here as practices that are thought to be effective, yet practical, in eliminating or reducing environmental and social impacts. GMPs may include structural (e.g., a settling basin to remove suspended solids), biological (e.g., wetland plants to remove nutrients in effluent) or management practices (e.g., minimize use of chemicals) to solve a particular problem.

A single GMP seldom solves a problem; but a system of GMPs is normally required to prevent a particular type of farming or other activity from causing negative impacts. Therefore, for an activity such as shrimp farming, a system based on GMPs requires identification of potential impacts (environmental and social) and the implementation of GMPs to prevent or mitigate the possible impacts.

### 4. Potential Impacts of Shrimp Farms

The first step in developing GMPs is to identify the key impacts that need to be addressed. Shrimp farming is a comparatively new activity, but possible impacts associated with operating shrimp farms are well known and include:

- Conversion of mangrove and other coastal wetlands to ponds
- Nutrient enrichment and eutrophication of coastal waters by pond effluents
- Discharge of potentially toxic and bioaccumulative chemicals into natural ecosystems
- Sedimentation in coastal waters because of erosion from ponds and other earthen infrastructure
- Salinization of freshwater sources by pond effluents or seepage
- Reduction in biodiversity of coastal ecosystems caused by water pollution, sedimentation, and toxicity of effluents
- Introduction of non-native species or new shrimp diseases into coastal waters
- Competition with other activities for natural resources
- Land use disputes

### 5. Operating Guidelines and Procedures for Shrimp Farms

This manual was developed with the input from international and national experts on shrimp farming operations and was reviewed by shrimp farmers at a series of regional workshops held in Thailand in February 1999.

GMPs are promoted to eliminate or minimize the negative environmental impacts listed above. The other sections of the manual discuss general guidelines for shrimp farm operations, specific procedure for implementing these guidelines, and a series of checklists and record keeping forms for farm management.

### 6. Operating Guidelines

#### *1) Site Selection for New Shrimp Farms*

Proper location of a shrimp farm is important for minimizing the adverse environmental and social impacts and in maximizing production rates.

GMPs for site selection includes:

- 1.1 The shrimp farm owner should have clear title or right to their property or other legal land concession agreements.

- 1.2 All stakeholders should be involved in area zoning for shrimp farming.
- 1.3 The carrying capacity of an area would be determined in order to prevent too many shrimp farms in one place.
- 1.4 The water and soil quality should be suitable for shrimp farming and farms should be located far away from pollution sources.
- 1.5 Farmers should register with the appropriate government agencies.

## **2) General Pond Management**

Good pond management helps prevent water pollution, loss of biodiversity, and other negative environmental impacts, and it will improve the efficiency of shrimp production.

GMPs for pond management include:

- 2.1 Good water quality should be maintained by using stocking and feeding rates that do not exceed the assimilative capacity of the culture system and by using high quality feeds and good feeding practices.
- 2.2 Water exchange should be reduced as much as possible.
- 2.3 Fertilizers, liming materials, and all other chemicals should be used in a responsible manner and only as needed.
- 2.4 Good shrimp health management should be used.
- 2.5 Aerators should be positioned and operated to minimize erosion and creation of sediment mounds in pond bottoms.
- 2.6 Water inlets and outlet to ponds should be screened to prevent entrance of competitors and release of culture species.
- 2.7 Predator control methods that do not require destruction of ecologically important species in receiving water should be used.

## **3) Stocking Density**

Stocking density is an important consideration in shrimp farming because the amount of feed needed to culture shrimp to market size increases in direct proportion to the stocking density. As feeding rates increase, water and soil quality in ponds tends to deteriorate. Ponds with high stocking rates tend to have poorer water quality than ponds stocked at moderate density. Impaired water quality stresses shrimp and reduces the efficiency with which they convert feed to shrimp flesh resulting in increased feed cost. Stress can also lead to a greater incidence of disease. Effluents from ponds with excessive stocking and feeding rates are of lower quality and have a greater potential to cause water pollution than effluents from ponds stocked at more reasonable rates.

GMPs for optimizing stocking density include:

- 3.1 Stocking densities should be based on anticipated survival, desired size at harvest, and carrying capacity of ponds.
- 3.2 The size and age of shrimp fry should be considered.

#### **4) Feed management**

Feed is the basis for high levels of shrimp production in intensive shrimp culture ponds. However, shrimp do not eat all the feed provided to them, and only a portion of the feed consumed is converted to shrimp flesh. Uneaten feed, feces, and metabolic wastes enter ponds and serve as nutrients for phytoplankton. Ammonia excreted into pond water by shrimp can reach toxic concentrations. As feeding rates increase, water quality and soil quality in ponds usually deteriorates.

Good feed quality and careful feed management are essential ingredients for efficient shrimp culture. By using high quality feeds in reasonable quantities, water and soil quality in ponds is protected. This reduces stress on shrimp, less likelihood of disease, and converting feed more efficiently to improve the feed conversion ratio and minimize feed costs. Better water quality in ponds allows a higher quality effluent and reduces the possibility for negative environmental impacts in receiving water bodies.

GMPs for feed management include

- 4.1 Feed should be purchased fresh and not stored for more than one month.
- 4.2 Feed should be stored in cool and dry areas.
- 4.3 Feed management practices should be implemented to assure that shrimps consume the feed as completely as possible
- 4.4 Medicated feed should be used only if necessary for the control of a specific diagnosis of disease.
- 4.5 Cut fish should not be used as shrimp feed, but if it is, care should be take to prevent overfeeding.
- 4.6 Pond managers should keep careful records of daily feed application rates so that feed conversion ratio (FCR) can be assessed.

#### **5) Shrimp Health Management**

Authorities on shrimp health management recognize that stress reduction through better handling, reasonable stocking densities, good nutrition, and optimal environmental conditions in ponds can prevent most infectious and non-infectious diseases. Treatment should be undertaken only when a specific disease has been diagnosed and that this disease is treatable. Also, effective measure must be taken to minimize the spread of disease between farm stocks and natural stocks.

GMPs for shrimp health management include.

- 5.1 Water quality evaluation and management should be implemented to avoid stressing shrimp, but when stressful conditions are observed, shrimp should be checked of diseases.
- 5.2 For non-infectious disease related to pond conditions, adopt the best option for disease treatment or for correcting pond conditions.
- 5.3 For infectious diseases that may spread widely, isolate the pond, net harvest the remaining shrimp, and disinfect the pond before discharging the water.

#### **6) Therapeutic Agents and Other Chemicals**

There is considerable use of therapeutic agents and other chemicals in shrimp culture in Thailand. Some of the chemicals can be toxic to shrimp or accumulate in the flesh of shrimp and represent a potential hazard to the

consumer. Also, some chemicals may exist in effluents as residues and be harmful to the natural aquatic ecosystems. Reducing the use of these therapeutic agents and chemicals will not only improve environment performance but also reduce cost of operating shrimp farms. Shrimp health management should focus on disease prevention through good nutrition, sound pond management, and overall stress reduction rather than disease treatment.

GMPs for safe use of therapeutic agents and other chemicals include:

- 6.1 Shrimp farmers should follow reliable information regarding dosage, withdrawal period, proper use, storage, disposal, and other constraints on the use of a chemical including environmental and human safety precautions.
- 6.2 When potentially toxic or bioaccumulative chemicals are used in ponds, waters should not be discharged until compounds have naturally decomposed to non-toxic form.
- 6.3 Careful record should be maintained regarding use of chemicals in ponds.
- 6.4 Store therapeutants in a cool place and in a secure manner where they will be inaccessible to unauthorized personnel, children, and animals. Dispose of unused compounds by methods that prevent environmental contamination.
- 6.5 Drug, antibiotic, and other chemical treatments should be done in accordance with recommended practices and comply with all national and international regulations.

## **7) Effluent and Solid Waste Management**

Pond effluents often contain elevated concentrations of nutrients, biochemical oxygen demand, suspended solids, and possibly other potential pollutants. Pond management GMPs outlined previously can help improve effluent quality and reduce effluent volume. Effluent quality can be further improved by adjusting the discharge infrastructure and by the timing and manner of final discharge. Shrimp farms also generate solid wastes that should be disposed of in a manner that does not damage aquatic or terrestrial ecosystems.

GMPs for effluent and solid waste management include:

- 7.1 Canals and embankments should be maintained in a manner to reduce erosion of above water portions.
- 7.2 Minimize water exchange by adopting appropriate technologies.
- 7.3 Use efficient fertilization and feeding practices to promote natural primary productivity while minimizing nutrient inputs.
- 7.4 Store and use fuels (e.g. diesel oil, gasoline, kerosene, etc.), feeds, and other products in a responsible manner to avoid accidental spills that could contaminate water. An emergency plan should be made for containing accidental spills
- 7.5 The effluent should be treated before discharging, complying with existing standards.
- 7.6 Ponds should be drained in a manner that would minimize resuspension of sediment and prevent excessive water velocities in canals and at effluent outfalls.
- 7.7 Design outfalls so that no significant impacts of effluents on natural water occur beyond the mixing zone.
- 7.8 Shrimp pond effluents should not be discharged into freshwater areas or onto agricultural land.

- 7.9 Sediment from ponds, canals, or settling basins should be put back into areas that were eroded, used as earthfill, or disposed in some other environmentally-responsible way.
- 7.10 Sanitary facilities for disposal of human wastes and other health facilities should be provided.
- 7.11 Garbage and other farm wastes should be managed by acceptable methods.
- 7.12 Shrimp farms should comply with existing governmental regulations related to effluents and other wastes.
- 7.13 Managers should routinely evaluate waste management procedures and continually attempt to improve them.

## **8) Social Responsibility**

Sometimes, conflicts arise between shrimp farmer and others who either live in the coastal zone or depend upon coastal zone resources for their livelihood. Shrimp farmers also employ people, and conflicts may arise over various employee-employer relationship. Public relations and employee welfare are complex issues, but general guidelines presented in the GMPs will be useful in enhancing the prospects of harmonious interactions among large shrimp farming companies, workers, and the local community. In Thailand there are many small shrimp farms in addition to large company-operated farms, and many of the issues related to community relations are being addressed through other sectors of the industry, such as government regulations and shrimp farming associations.

GMPs for improving community relations include:

- 8.1 Shrimp farmers or associations should communicate with community leaders. This is particularly important in the planning stages for new farms or expansions.
- 8.2 Shrimp farmers or associations should attempt to accommodate traditional uses of coastal resources and encourage mangrove replantation activities through a cooperative attitude towards established local interest and environmental stewardship.
- 8.3 Shrimp farmers or associations should contribute to community efforts to improve local environmental conditions, public health and safety, and education.
- 8.4 Local workers should be employed as possible, and they should be fairly compensated with respect to local wage scales.
- 8.5 Healthy and safe living and working conditions should be provided.
- 8.6 Shrimp farm management should have clearly-defined and posted security policies.
- 8.7 Employees should have a clear understanding of their duties and of company expectations regarding their performance.

## **9) Farmer Associations and Education**

Shrimp farmers should form cooperatives or associations by region in order to exchange technology and to achieve cooperation in water use and water management. Shrimp culture techniques are also constantly improving, and it is important that shrimp operators continue to update their knowledge of sustainable farming techniques.

GMPs for farmer association and education include:

- 9.1 Farmer associations should be encouraged. Meetings among members should be routinely held for exchanging information on shrimp culture.
- 9.2 The farmers would participate in training on the various aspects of shrimp farm management, in the manner of friendly environment practices, and for law and regulation for shrimp culture industry.
- 9.3 The associations should promote “environmentally-friendly” practices.

## **10) Data collection**

Data collection on the above topics and farm accounts should be properly done. Shrimp farming association should cooperate with the Department of Fisheries in the collection, organization and evaluation of data to demonstrate the adoption of GMPs and document the benefits of their use.





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he Southeast Asian Fisheries Development Center (SEAFDEC), a regional treaty organization based in Bangkok, Thailand was established in December 1967 to promote fisheries development in the region. Its Member Countries are Japan, Malaysia, the Philippines, Singapore, Thailand, Brunei Darussalam, the Socialist Republic of Vietnam, Union of Myanmar, Indonesia Cambodia and Lao Peoples Democratic Republic. The Council of Directors who represents SEAFDEC Member Countries is the policy-making body of the organization.



SEAFDEC conducts research on appropriate fisheries technologies, trains fisheries and aquaculture technicians, and disseminates fisheries and aquaculture technologies. Four departments were established to pursue these objectives

The Training Department (TD) in Samut Prakan, Thailand (1967) for marine capture fisheries training

The Marine Fisheries Research Department (MFRD) in Singapore (1967) for fishery post-harvest technology

The Aquaculture Department (AQD) in Tigbauan, Iloilo, Philippines (1973) for aquaculture research and development

The Marine Fishery Resources Development and Management Department (MFRDMD) in Kuala Terengganu, Malaysia (1992) for the development and management of marine fishery resources in the exclusive economic zones (EEZs) of SEAFDEC Member Countries

SEAFDEC/AQD is mandated to

Promote and undertake aquaculture research that is relevant and appropriate for the region

Develop human resources for the region

Disseminate and exchange information on aquaculture

The Aquaculture Department (AQD) maintains four stations in the Philippines: in Iloilo Province, the Tigbauan Main Station and the Dumangas Brackishwater Substation; in Guimaras, the Igang Marine Substation; and in Rizal, the Binangonan Freshwater Station.



Tigbauan Main Station



Dumangas Brackishwater Substation



Igang Marine Substation



Binangonan Freshwater Station

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May: Photo: Pivotal On Earth



The ASEAN-SEAFDEC Fisheries Consultative Group (FCG) was organized by ASEAN and SEAFDEC in March 1999 to (a) identify important regional and international fisheries issues; (2) provide technical assistance and inputs to ASEAN for formulation and implementation of common policies; (3) assist the Member Countries in formulating common stand and positions on regional and international fishery issues; and (4) develop and implement collaborative programs. The FCG comprises the Chairman and representatives of the ASEAN Working Group of Fisheries (WGF<sub>i</sub>), the SEAFDEC Secretary-General and his representatives, and the SEAFDEC Department Chiefs with the WGF<sub>i</sub> Chairman and SEAFDEC Secretary-General as Co-Chairpersons.

Included in the first four projects implemented through the FCG collaborative mechanism, is the Promotion of Mangrove-Friendly Aquaculture in Southeast Asian Countries with the SEAFDEC/AQD as the Lead Department for SEAFDEC and Thailand as the Lead Country for the ASEAN.

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