

**REGIONAL GUIDELINES  
FOR RESPONSIBLE AQUACULTURE  
IN SOUTHEAST ASIA**



Southeast Asian Fisheries Development Center

## FOREWORD

Aquaculture is an important solution to the problem of declining fisheries catch brought about by intense fishing pressure due to the rapidly increasing world population and demand for food. Aquaculture is particularly important in Asia, which accounts for 90% of the world production. The species farmed in Asia range from seaweeds to herbivorous fishes and mollusks to carnivorous fishes, shrimps, and crabs. Farming of carps has been practiced for three thousand years in China and probably a few hundred years in parts of Southeast Asia. Farming of milkfish is hundreds of years old in Indonesia, the Philippines, and Taiwan. Such length of time indicates that aquaculture can be sustainable.

Unfortunately, aquaculture like capture fisheries can also be subject to abuse. Irresponsible fishing and farming practices can destroy sensitive ecosystems, lower biodiversity, and cause social conflicts, all in the pursuit of short-term gains. Recent events have shown how unsustainable some forms of aquaculture can be. For example, the shrimp culture industry has boomed and collapsed within a few years in several countries in Asia. But with the industry decline, there also lies hope. In most cases, the collapse has been followed by gradual re-growth as humbled growers realize the folly of the 'slash-and-burn' type of aquaculture and adopt more responsible practices.

Article 9 of the *Code of Conduct for Responsible Fisheries* focuses on Aquaculture Development and aims to forestall or mitigate the negative effects of aquaculture. The Article 9 guidelines could not have come at a better time. Increasing demand for fish is fueling the intensification of the aquaculture industry. With intensive farming practices always lies the danger of over-taxing the ecosystem. The *Regional Guidelines for Responsible Aquaculture in Southeast Asia* is the product of many minds from all the countries in Southeast Asia.

The Regional Guidelines for Responsible Aquaculture in Southeast Asia is the second of a series of Regional Guidelines developed by SEAFDEC, the first being the Regional Guidelines for Responsible Fishing Operations published by SEAFDEC in 1999. These Regional Guidelines have been developed under the collaborative mechanism of the ASEAN-SEAFDEC Fisheries Consultative Group (FCG), with the financial support of the Government of Japan through its Trust Fund Project. It is hoped that the governments in these countries will implement the guidelines and make their respective aquaculture industries vibrant, socially relevant, profitable, and sustainable.



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# **REGIONAL GUIDELINES FOR RESPONSIBLE AQUACULTURE IN SOUTHEAST ASIA**

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# CHAPTER I

## INTRODUCTION

To help ensure that future generations will be able to avail themselves of the resources of the seas and inland waters, the *Code of Conduct for Responsible Fisheries* (CCRF) was adopted during the 28<sup>th</sup> Session of the FAO Conference held on 31 October 1995. The CCRF was the result of four years of work following the International Conference on Responsible Fishing in Cancun, Mexico in May 1992. Experts from various fisheries-related disciplines from around the world deliberated long and hard to come up with the final CCRF document. Article 9 of the Code is on Aquaculture Development. The 1995 Conference also directed the FAO to “elaborate as appropriate technical guidelines in support of the implementation of the Code.” The *FAO Technical Guidelines for Responsible Fisheries No. 5: Aquaculture Development* was published in 1997.

To be globally acceptable, the CCRF as finally worded is the product of compromise and consensus on controversial issues. Specific regional issues were diluted, glossed over, or perhaps even avoided altogether. Realizing this situation, the Council of Directors of the Southeast Asian Fisheries Development Center (SEAFDEC) approved a program for the ‘regionalization’ of the CCRF during the 30<sup>th</sup> Council Meeting at Bandar Seri Begawan, Brunei Darussalam on 17-21 March 1998. Since there can only be one CCRF and one set of standards that should apply globally, ‘regionalization’ was taken to mean the preparation of a set of guidelines such that the issues of particular importance to southeast Asia can be amplified and elaborated on.

In 1999, a SEAFDEC Consultant drew up a set of possible considerations in the preparation of the regional guidelines of CCRF Article 9. The report was circulated to the fisheries agencies of all the member countries for their respective aquaculture experts to review. On 31 July to 2 August 2000, a Pre-Technical Meeting of Core Experts was held in Iloilo City, Philippines and produced a set of draft regional guidelines. The scientists and staff of the SEAFDEC Aquaculture Department facilitated the discussions in this and the subsequent meetings on the regionalization of CCRF Article 9.

By the end of August, the Core Experts were assigned: Mr. Haji Abdul Rajid Haji Metali (Brunei Darussalam), Mr. Srun Lim Song (Cambodia), Mr. Anro Sunaryanto (Indonesia), Mr. Bounma Luang Amath (Lao PDR), Mr. K. Subramanian (Malaysia), Mr. U Hla Win (Myanmar), Mr. Nelson A. Lopez (Philippines), Ms. Renee Chou (Singapore), Mr. Siri Tookwinas (Thailand) and Mr. Tran Van Quynh (Vietnam). The Core Aquaculture Experts Consultation was held on 21-22 November 2000 in Iloilo City. The Core Experts deliberated on the draft guidelines and made sure important regional issues were covered. The revised regional guidelines were then circulated to all the SEAFDEC member countries. Each country held a national seminar in February-May 2001 to allow the various stakeholders in the aquaculture sector to know and comment on the regional guidelines.



On 17-19 July 2001, the Government Consultation on the Regional CCRF on Aquaculture Development was convened in Iloilo City as the final step in the regionalization process. After another round of deliberation, review, and revision, the representatives of the various southeast Asian governments reached a consensus on the final wording of the *Regional Guidelines for Responsible Aquaculture in Southeast Asia*. SEAFDEC obtained the commitment of these representatives that their governments will support and implement the *Regional Guidelines*.

## CHAPTER II

# GENERAL PRINCIPLES

### Objectives

The objectives of the *Regional Guidelines for Responsible Aquaculture in Southeast Asia* are the following:

- To clarify the requirements of the Code of Conduct for Responsible Fisheries
- To identify and prioritize the required action
- To identify the issues that require special consideration in the regional context
- To facilitate the formulation of regional policies to enable the implementation of the CCRF in the member-countries of the Association of Southeast Asian Nations (ASEAN)
- To facilitate the formulation and implementation by the ASEAN member countries of national codes of practice for responsible aquaculture

### Rationale

The *Regional Guidelines for Responsible Aquaculture in Southeast Asia* was prepared in consideration of the following:

**Southeast Asian traditions and culture.** Although the traditions and cultures of the ten countries comprising SEAFDEC and the Association of Southeast Asian Nations (ASEAN) are varied, at least two things stand out in common. First, the peoples of all the ten countries are fish-eating, meaning, fish is part of the daily diet and a major if not main source of animal protein. Second, aquaculture forms part of each country's traditions and economy. Aquaculture is already part of daily life and products of aquaculture already contribute to the meal tables in all the ten countries. This being the case, the existence and practice of aquaculture no longer need to be justified in the region. Aquaculture only has to be rationalized in the light of increasing pressure to intensify production and the inherent setbacks when farmers do not behave responsibly.

**Structure of the aquaculture industry in Southeast Asia.** Due to the long tradition, the aquaculture industry in the region is very heterogeneous in terms of the species being cultured and the scales of operation. Aquaculture enterprises range from a small fish cage owned and run by a farming or a fishing family to augment their food and income, to several hundred hectares of fish or shrimp ponds owned by a company and run by employees. Marketing can be on a farm-gate basis with the buyer picking up the freshly harvested fish, or can involve processing, cold storage, and eventual shipment of the product to a foreign country. The



industry is also multi-tiered, consisting of pond, pen, and cage builders, fry gatherers and dealers, feed and other input suppliers, harvesters, processors, and buyers and sellers at different levels.

**Southeast Asian ecosystems.** The region is largely tropical and monsoonal. Seasons for breeding and growing aquatic products are many months long, dictated more by rain, wind, and salinity than by temperature. Since the temperature is nearly always optimum, breeding and grow-out can take place the whole year. The region's inland and coastal ecosystems and the component flora and fauna are highly diverse. Such diversity makes possible the diversity of aquaculture practices in the region. The complexity of ecosystems also makes the introduction of exotic or non-native species more dangerous and harder to predict. A seemingly benign introduced exotic such as tilapia can eliminate native species in lakes. Disease agents in introduced species can be lethal to non-immune native species and can be difficult to eradicate from the ecosystem. A greater amount of caution is therefore needed before introductions of exotic species are allowed in southeast Asian ecosystems.

### **Area of Coverage**

The preparation of the *Regional Guidelines for Responsible Aquaculture in Southeast Asia* made up Phase 2 of the SEAFDEC Program for the Regionalization of the CCRF. The *Regional Guidelines* supports the implementation of the CCRF by the ASEAN countries and applies to aquaculture in both coastal marine waters and inland waters (lakes, reservoirs, and rivers). Although the *Regional Guidelines* has been prepared primarily by and for the SEAFDEC and ASEAN member countries, it is hoped that neighboring countries in Asia with the same set of circumstances will also find it useful.

### **International Legal Instruments**

Aquaculture operations are generally private enterprises and very rarely cross national boundaries. The international laws, Agreements and Conventions referred to in the CCRF generally have no provisions on aquaculture. However, there are two instances where international agreements are relevant to aquaculture. One, the transboundary transport of live organisms (broodstock, juveniles, fry or other seedstock) for aquaculture may be subject to the requirements of the Convention on the International Trade of Endangered Species of Wild Fauna and Flora (CITES) in case of endangered species. Two, the occurrence of certain diseases in aquaculture facilities may need to be reported under the requirements of the Office International des Epizooties (OIE).

# CHAPTER III

## DEFINITION OF TERMS

### APPLIED TO SOUTHEAST ASIAN AQUACULTURE

#### **Aquaculture**

Aquaculture means the farming of aquatic organisms including fish, mollusks, crustaceans, echinoderms, and aquatic plants. Farming implies some form of intervention in the rearing process to enhance production, such as regular stocking, feeding and protection from predators. Farming also implies individual or corporate ownership of or rights resulting from contractual arrangements to, the stock being cultivated primarily for livelihood and business activities. For statistical purposes, aquatic organisms harvested by an individual or corporation, which has owned them throughout their rearing period contribute to aquaculture, whereas aquatic organisms exploited by the public as a common property resource, with or without appropriate licenses, are the harvest of fisheries.

#### **Sustainable development**

Sustainable development is the management and conservation of the natural resource base and the orientation of technological and institutional change in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations. Such sustainable development (in the agriculture, forestry, and fisheries sectors) conserves land, water, and plant and animal genetic resources, and is environmentally non-degrading, technically appropriate, economically viable and socially acceptable.

#### **Responsible fisheries**

Use or harvest of aquatic resources in harmony with the environment – a concept encompassing capture (fishing) and culture (farming) methods and practices that are not harmful to ecosystems and resources, transformation processes that add value to the products and meet the required sanitary standards, and commercial practices that provide consumers good quality products.

#### **Responsible aquaculture**

Responsible aquaculture encompasses use of appropriate and efficient production technologies, proper transformation processes to add value to fishery products, and appropriate commercial practices, including postharvest handling, processing, and marketing to provide consumers good-quality products.

#### **Aquafarms and aquafarmers**

Same as aquaculture farms and aquaculturists.





### **Small-scale aquaculture**

Farming and husbandry of aquatic organisms to augment nutrition or income, with limited capitalization and family or household labor or in coordination with hired labor.

### **Aquaculture production**

Output of cultured aquatic organisms either for final consumption, or as raw material for transformation into other products, or for trade. Aquaculture production also includes commodities quantified by numbers rather than by weight such as ornamental fish and hatchery output.

### **Infrastructure for aquaculture**

Includes common waterways, water and sludge treatment facilities, postharvest facilities, farm to market roads, access to financing, power, and communication.

### **Aquaculture workers**

Persons engaged in aquaculture work such as repairing ponds, water supply, feeding. Persons who are engaged exclusively in management, such as planning and accounting, are excluded.

### **Culture-based fisheries**

Capture or harvest of aquatic organisms grown in open waters from artificially stocked seed produced from hatcheries.

### **Sea ranching**

Production of identifiable stocks that are intended to be harvested by the releasing agency, implying a cost-benefit analysis based on comparing the harvested value with the cost of production, release and harvesting.

### **Stock enhancement**

Maintaining or sustaining the productivity of marine and freshwater bodies through the production and stocking of seeds and the maintenance and development of fishing grounds. Enhancements may take the form of introduction of new species, stocking natural and artificial water bodies, fertilization, and environmental engineering including habitat improvements, open water reserve management, and modification of water bodies.

### **Co-management**

A management approach in fisheries and aquaculture where authority, functions, and responsibilities are shared between two or more parties, such as a local government unit and the resource users, or between States in the case of transboundary resources or ecosystems.

### **Biological diversity or biodiversity**

The variety and variability of life on earth, comprising of ecosystems, species, populations, and gene pools in given geographic areas.

### **Biological resources**

Includes gene pools, organisms or parts thereof, populations, species, or any other biotic component of ecosystems with actual or potential use or value for humanity.

### **Genetic diversity**

The variety of genes and genotypes of populations and species in a given geographic area.

### **Broodstock**

Aquatic animals grown to sexual maturity for breeding purposes, or wild adults captured for the same purpose.

### **Seedstock**

Young or early stages or smaller sizes of aquatic organisms stocked in aquaculture facilities or environments to be raised to larger and higher valued sizes. Seed stock includes eggs, larvae, postlarvae, fry, fingerlings or post-fingerlings, juveniles, mollusk spats, and seaweed cuttings.

### **Biotechnology**

Any process that uses living organisms, in their entirety, or parts or subparts thereof, to make or modify products or to improve or develop plants, animals or microorganisms for specific use.

### **Genetically altered organisms**

Organisms with a genetic makeup that is the result of human intervention, including genetically modified organisms (GMOs), hybrids, inbreds, and offspring of selective breeding.

### **Transgenic organisms**

Organisms that carry foreign genes.

### **Exotic species**

Species that do not naturally occur in a given ecosystem or bio-geographic area (which may or may not coincide with state or country borders).



### **Non-indigenous species**

Species not native to a country, or not native to a specific locality or ecosystem although found elsewhere in the same country.

### **Introduced species**

Species intentionally or accidentally transported and released by man into an environment outside its natural or present geographic range.

### **Mangroves**

In particular, the tropical salt-tolerant trees, or in general, the tropical coastal ecosystem where these salt-tolerant trees and associated plants live together with a large variety of mollusks, crustaceans, other invertebrates, fishes, and terrestrial vertebrates.

### **Notifiable diseases**

Transmissible diseases on the list of the Office International des Epizooties – diseases considered to be of socio-economic and/or public health importance within countries and that are significant to international trade in aquatic animals and aquatic animal products.

### **Epizootic**

Widespread outbreak of fish disease.

### **Antibiotics**

Chemical substances, naturally produced by microorganisms but also synthetically, that inhibit the growth or even destroy bacteria and other microorganisms.

### **Chemical inputs**

Substances applied to ponds or hatcheries for the purpose of altering the culture environment to benefit the organisms being cultured. Examples are lime, inorganic fertilizers, pesticides, algicides, fungicides, bactericides, and antibiotics. The intended effect on the environment can be increased fertility, reduction or complete elimination of extraneous and unwanted organisms, promotion of the growth of beneficial organisms, or prevention or management of diseases.

### **Drugs**

Substances applied to soil or water or added to feeds for the purpose of preventing, managing or treating disease, promoting the growth, changing the sex, or otherwise changing the physiological condition of cultured organisms.

### **Therapeutants**

Substances used for the prevention and control of disease.

### **Feed additives**

Substances added to feed for the purpose of promoting growth and maintaining the health of cultured animals, and enhancing the quality and marketability of the products.

### **Feeds**

Materials given to cultured animals for the purpose of nourishing them. Such materials could be wet, dry, live, natural and unprocessed biomass, or formulated from a variety of ingredients.

### **Fertilizers**

Materials of biological or mineral origin used to enhance the natural productivity of an aquaculture facility or environment.

### **Manure**

Fecal material from human or animal sources, as well as compost and plant materials that increase the organic matter or nutrient content of a culture environment or facility.

### **Offal**

Waste products from abattoir, poultry dressing plants, or fish processing plants. Fish offal consists of entrails, heads, gills, fins, and other parts not usually used for human consumption.

### **Sludge**

Materials that accumulate on the bottom of aquaculture ponds, tanks and pens or below fish cages consisting of silt, dead plankton, uneaten feed, dead organisms, exuviae, feces and other waste products of metabolism and environmental processes.

### **Water extraction**

Generally refers to the drawing of ground water (from the aquifer or water table, not surface water from rivers, streams or lakes).

### **HACCP**

Hazard Analysis Critical Control Points: a system that identifies, evaluates, and controls hazards significant for food safety.

### **Risk analysis**

A process consisting of risk assessment, risk management, and risk communication. Risk assessment is a scientifically based process consisting of hazard identification and characterization, exposure assessment, and risk characterization. Risk management is the process of weighing policy alternatives in the light of the results of risk assessment and if required, selecting and implementing appropriate control options, including regulatory measures. Risk communication is the interactive exchange of information and opinions concerning risk among risk assessors, risk managers, consumers, and other interested parties.

### **Transboundary**

Describes species, populations, natural systems, activities, measures, and effects that extend beyond the effective jurisdiction of a single State.

## CHAPTER IV

# REGIONAL GUIDELINES FOR RESPONSIBLE AQUACULTURE

Article 9 of the *Code of Conduct for Responsible Fisheries*, if implemented, can be an important instrument to achieve sustainable aquaculture around the world. The implementation of the Code in general and Article 9 in particular is a long-term process and necessitates the commitment and support of all governments. The *Regional Guidelines for Responsible Aquaculture in Southeast Asia* is the result of a series of consultations over a one-year period among Core Experts and government representatives from all member countries of the ASEAN. Having been adopted on 19 July 2001, the Regional Guidelines must now be implemented.

Since the *Regional Guidelines* elaborates on Article 9 of the CCRF, the original article numbers and statements are shown below to the left of the regional guidelines. Where a regional guideline is not provided, the original Article 9 guideline applies. It should also be noted that the *FAO Technical Guidelines for Responsible Aquaculture No. 5: Aquaculture Development* applies in the general sense to aquaculture in southeast Asia.

### **Article 9: Aquaculture Development**

<b>Article 9.1: Responsible development of aquaculture, including culture-based fisheries, in areas under national jurisdiction.</b>
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<p>Aquaculture has been recognized for its important role in the food security programs of governments in the region. Thus, governments are mainly responsible for promoting and regulating present and future aquaculture development within their national jurisdiction. Rapid development of aquaculture in the region and elsewhere necessitates that governments ensure that aquaculture be technically appropriate, economically viable, socially acceptable, and environment-friendly. Where countries in the region have existing laws and regulations, these should be properly implemented and enforced. Where laws and regulations are lacking, national governments must develop the legal frameworks to ensure that the aquaculture sector is adequately regulated and protected. These frameworks must clearly define the responsibilities of the State and the farmers and include evaluation of the impact of aquaculture on natural resources and human communities.</p>
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Original Article	Regional Guidelines
<p><b>Article 9.1.1</b></p> <p>States should establish, maintain and develop an appropriate legal and administrative framework, which facilitates the development of responsible aquaculture.</p>	<ol style="list-style-type: none"> <li>1) States should regularly compile, review, evaluate, and update all information, laws, and regulations pertaining to aquaculture and related activities.</li> <li>2) States should improve the national statistical system covering aquaculture and using a format compatible with regional and global databases.</li> <li>3) States should take all reasonable and practicable measures to ensure that there are no conflicts in existing laws and regulations and that they are properly implemented and complied with.</li> <li>4) States should establish the legal framework for the use of non-land based aquaculture, emphasizing the integration of aquaculture into coastal area management.</li> </ol>
<p><b>Article 9.1.3</b></p> <p>States should produce and regularly update aquaculture development strategies and plans, as required, to ensure that aquaculture development is ecologically sustainable and to allow the rational use of resources shared by aquaculture and other activities.</p>	<ol style="list-style-type: none"> <li>1) Given the importance of small-scale aquaculture in the region, States should address the concerns of food security, poverty alleviation, and income generation in aquaculture development plans.</li> <li>2) As much as practicable, States should provide basic infrastructure and assistance for ecologically sustainable aquaculture development.</li> <li>3) States and the region should adopt an integrated approach to the development, maintenance, preservation, and sustainable use of aquaculture areas including lakes, rivers, mangroves, and other aquatic ecosystems.</li> <li>4) Given the importance of mangroves, States and regional institutions should prepare regional guidelines for the responsible use of mangroves for aquaculture. States should ensure coordination among departments, agencies, and other units that have jurisdiction and stake in mangroves.</li> <li>5) States should ensure that abandoned and unutilized aquaculture facilities are rehabilitated as far as possible to an ecologically sustainable system.</li> </ol>

<p><b>Article 9.1.4</b></p> <p>States should ensure that the livelihoods of local communities, and their access to fishing grounds, are not negatively affected by aquaculture developments.</p>	<ol style="list-style-type: none"> <li>1) <i>In the use of resources for aquaculture development, States should recognize the needs of other users, promote cooperation, and minimize resource-use conflicts.</i></li> <li>2) <i>States should establish appropriate zones for aquaculture development and other uses.</i></li> <li>3) <i>States should ensure that aquaculture operations are coordinated or integrated with other food production sectors, and with economic and cultural activities.</i></li> </ol>
<p><b>Article 9.1.5</b></p> <p>States should establish effective procedures specific to aquaculture to undertake appropriate environmental assessment and monitoring with the aim of minimizing adverse ecological changes and related economic and social consequences resulting from water extraction, land use, discharge of effluents, use of drugs and chemicals, and other aquaculture activities.</p>	<ol style="list-style-type: none"> <li>1) <i>States and the region should develop expertise and competence to conduct risk analysis, environment impact assessment, and monitoring in aquaculture.</i></li> </ol>



**Article 9.2: Responsible development of aquaculture including culture-based fisheries within transboundary aquatic ecosystems**

In the region, there are several river basins and coastal areas shared by two or more countries. These include the Mekong and Ma river basins and coastal areas within the Gulf of Thailand, Bay of Bengal, and Straits of Malacca. Some practices of aquaculture and culture-based fisheries may affect, and be affected by other activities in these transboundary aquatic ecosystems. Although there are international and bilateral agreements in place, States should give special attention to the evaluation and management of risks related to aquaculture. These risks include environmental degradation, diseases, introduction of exotic species, and release of genetically altered organisms into shared water bodies.

- *States sharing aquatic ecosystems should seek the assistance of regional and international organizations in making aquaculture development plans.*
- *Neighboring States should take responsibility and cooperate to conserve aquatic animal and plant diversity in the transboundary aquatic ecosystems.*

<b>Original Article</b>	<b>Regional Guidelines</b>
<p><b>Article 9.2.1</b></p> <p>States should protect transboundary aquatic ecosystems by supporting responsible aquaculture practices within their national jurisdiction and by cooperation in the promotion of sustainable aquaculture practices.</p>	<ol style="list-style-type: none"> <li>1) <i>Neighboring States should identify transboundary ecosystems, land and water uses affecting and affected by aquaculture, and major common problems, if any.</i></li> <li>2) <i>States should promote aquaculture co-management schemes between and among States and among stakeholders.</i></li> </ol>
<p><b>Article 9.2.2</b></p> <p>States should, with due respect to their neighbouring States, and in accordance with international law, ensure responsible choice of species, siting and management of aquaculture activities which could affect transboundary aquatic ecosystems.</p>	

<p><b>Article 9.2.3</b></p> <p>States should consult with their neighbouring States, as appropriate, before introducing non-indigenous species into transboundary aquatic ecosystems.</p>	
<p><b>Article 9.2.4</b></p> <p>States should establish appropriate mechanisms, such as databases and information networks to collect, share and disseminate data related to their aquaculture activities to facilitate cooperation on planning for aquaculture development at the national, sub- regional, regional and global level.</p>	<ol style="list-style-type: none"> <li>1) <i>States should be responsible for immediately informing neighboring States about the occurrence of notifiable diseases and newly emerging diseases in aquaculture facilities and in the wild.</i></li> <li>2) <i>States should be responsible for promptly notifying neighboring States about epizootics and natural or man-made disasters, such as red tides and oil spills, as well as the subsequent abatement of the problem.</i></li> </ol>
<p><b>Article 9.2.5</b></p> <p>States should cooperate in the development of appropriate mechanisms, when required, to monitor the impacts of inputs used in aquaculture.</p>	<ol style="list-style-type: none"> <li>1) <i>States should establish appropriate mechanisms for quality control and monitoring of all inputs used in aquaculture.</i></li> </ol>

**Article 9.3: Use of aquatic genetic resources for the purposes of aquaculture including culture-based fisheries**

The local people have paramount rights over their own genetic resources, including any information and biotechnology products derived from these. States should promote the identification and characterization of local genetic resources, formulate guidelines for access to information and products covered by patents and intellectual property rights, and ensure equitable sharing of benefits from the use of these resources.

Original Article	Regional Guidelines
<p><b>Article 9.3.1</b></p> <p>States should conserve genetic diversity and maintain integrity of aquatic communities and ecosystems by appropriate management. In particular, efforts should be undertaken to minimize the harmful effects of introducing non-native species or genetically altered stocks used for aquaculture, including culture-based fisheries into waters, especially where there is a significant potential for the spread of such non-native species or genetically altered stocks into waters under the jurisdiction of other States as well as waters under the jurisdiction of the State of origin. States should, whenever possible, promote steps to minimize adverse genetic, disease, and other effects of escaped farmed fish on wild stocks.</p>	<ol style="list-style-type: none"> <li>1) <i>States should recognize the potentially serious impact of introduced species on the local aquatic biodiversity.</i></li> <li>2) <i>States should consider a total ban on the introduction of species shown by appropriate risk assessment to be detrimental to local ecosystems.</i></li> <li>3) <i>States should formulate guidelines for the development and use of genetically modified organisms (GMOs) and other products of biotechnology to ensure human safety and environmental protection.</i></li> <li>4) <i>States should comply with the ASEAN Guidelines for Risk Assessment of Agriculture-Related Genetically Modified Organisms.</i></li> <li>5) <i>States should formulate guidelines for the accreditation and licensing of sources and the labeling of genetically modified aquatic organisms.</i></li> <li>6) <i>Prior information and consent of the State must be secured before the introduction and propagation of genetically modified organisms and other biotechnology products.</i></li> <li>7) <i>States should monitor research and development on genetically modified organisms and promote proactive research to minimize the harmful effects of introducing these and other non-native species into natural environments.</i></li> </ol>

**Article 9.3.2**

States should cooperate in the elaboration, adoption, and implementation of international codes of practice and procedures for introductions and transfers of aquatic organisms.

- 1) *States should adopt a precautionary approach and formulate appropriate guidelines for the introduction and use of non-native species in aquaculture and culture-based fisheries, especially in transboundary ecosystems. In formulating these guidelines, a compilation of all relevant legal instruments of ASEAN member countries is necessary.*
- 2) *Established international guidelines for species introductions and transfers may be adapted for species used in aquaculture, and the specific responsibilities of States and aquafarmers must be clearly identified and delineated.*
- 3) *States should also formulate guidelines for the movement of aquatic species within the same country.*
- 4) *States should promote research on the impacts of introduced species on the local aquatic biodiversity.*
- 5) *States should support the implementation of the <sup>1</sup>Asia Regional Technical Guidelines for Health Management and Responsible Movement of Live Aquatic Animals and the Beijing Consensus and Implementation Strategy with emphasis on “phased implementation based on national needs.”*
- 6) *The National Strategies on Aquatic Animal Health Management in the <sup>1</sup>Technical Guidelines should be integrated into the national aquaculture development plans of States in the region. States should provide funds for its implementation.*

<sup>1</sup>FAO Fisheries Technical Paper 402. Also has provisions relevant to Articles 9.2.4, 9.3.3, 9.4.2, and 9.4.4.

<p><b>Article 9.3.3</b></p> <p>States should, in order to minimize risk of disease transfer and other adverse effects on wild and cultured stocks, encourage adoption of appropriate practices in the genetic improvement of broodstock, the introduction of non-native species, and in the production, sale, and transport of eggs, larvae or fry, broodstock or other live materials. States should facilitate the preparation and implementation of appropriate national codes of practice and procedures to this effect.</p>	<ol style="list-style-type: none"> <li>1) <i>States should formulate strategies for breeding and seed production of aquatic species for restocking in open waters (i.e., culture-based fisheries) and for genetic improvement of farmed species.</i></li> <li>2) <i>States should formulate and implement a national code of practice for the release of hatchery-bred stocks, and of exotic and even native species into natural water bodies for stock enhancement.</i></li> <li>3) <i>States should support appropriate research in genetics and molecular biotechnology and the establishment of needed gene banks for farmed aquatic species. Genetics research should include population studies of wild and hatchery-bred stocks.</i></li> </ol>
<p><b>Article 9.3.4</b></p> <p>States should promote the use of appropriate procedures for the selection of broodstock and the production of eggs, larvae and fry.</p>	<ol style="list-style-type: none"> <li>1) <i>States should formulate guidelines for the proper collection of wild broodstock and seedstock and the proper handling of the incidental catch.</i></li> <li>2) <i>States should encourage the private sector to actively engage in broodstock management and seed production.</i></li> <li>3) <i>States should support research and development on species appropriate for small-scale aquaculture and provide assistance for broodstock development and maintenance and seed production of these species.</i></li> </ol>
<p><b>Article 9.3.5</b></p> <p>States should, where appropriate, promote research and, when feasible, the development of culture techniques for endangered species to protect, rehabilitate and enhance their stocks, taking into account the critical need to conserve genetic diversity of endangered species.</p>	<ol style="list-style-type: none"> <li>1) <i>States should promote the establishment of gene banks for endangered species.</i></li> <li>2) <i>States should support region-wide collaborative research on endangered species.</i></li> </ol>

**Article 9.4: Responsible aquaculture at the production level**

Aquaculture is overwhelmingly concentrated in the developing world, providing important nutritional and economic benefits to rural communities and earning foreign currency for many Asian countries. The trends within many countries toward the use of more intensive aquaculture systems and more higher-value species often in sensitive coastal areas could increase the potential for environmental damage and may put additional stress on the socio-economic structure of local communities, if sustainable development approaches are not adopted.

Therefore, States should promote responsible aquaculture. It is also essential that the aquaculture industry and all the stakeholders involved adopt a strong commitment for cooperation and self-regulation. States should develop standards for responsible aquaculture. Many benefits can be derived from association in producer organizations and the development of voluntary codes of practice and guidelines, in line with standards set by the States.

In the Southeast Asian region, aquaculture farms are generally small or their capitalization is low. The aquafarmers are either not organized or except in very few cases, the associations are weak. In such a setting, there is need to provide farmers with technologies and guidelines for the efficient use of inputs to improve production and facilitate responsible practices.

Original Article	Regional Guidelines
<p><b>Article 9.4.1</b></p> <p>States should promote responsible aquaculture practices in support of rural communities, producer organization and fish farmers.</p>	<ol style="list-style-type: none"> <li>1) <i>States should promote responsible aquaculture as a means of livelihood to improve nutrition and income in small-scale fishing or farming communities.</i></li> <li>2) <i>States should provide financing and infrastructure support to rural communities, producer organizations, and aquafarmers to enable compliance with regulations and the practice of responsible aquaculture.</i></li> <li>3) <i>States should assist aquafarmers and producer organizations to identify appropriate aquaculture technologies and farming systems for use under different socio-economic and environmental conditions.</i></li> <li>4) <i>States should promote the integration of aquaculture with other farming systems.</i></li> <li>5) <i>States should document sources of inputs (fry, broodstock, feeds, etc.) and the availability and capacity of markets in order to assist aqua farmers and producer organizations in scaling and targeting the aquaculture operations.</i></li> <li>6) <i>States should actively pursue technology transfer and extension, information dissemination, and training in aquaculture operations, to include resource and environmental management.</i></li> </ol>



<p><b>Article 9.4.2</b></p> <p>States should promote active participation of fish farmers and their communities in the development of responsible aquaculture management practices.</p>	<ol style="list-style-type: none"> <li>1) <i>States should enable aquafarmers and their communities to organize and to practice responsible aquaculture based on the best information available.</i></li> <li>2) <i>States should enable aquafarmers to conduct an initial environmental assessment of their farms before starting large-scale projects.</i></li> <li>3) <i>States should support the establishment of networks to enable aquafarmers to access markets and services from extension workers, researchers, financing institutions.</i></li> <li>4) <i>States should establish suitable incentives and disincentives to encourage responsible aquaculture practices.</i></li> <li>5) <i>States should hold regular dialogues with producers to determine ways to maintain or increase production through responsible aquaculture practices.</i></li> <li>6) <i>States should institute data reporting systems (covering farm facilities, inputs, production, markets, disease outbreaks, etc.) involving farmers and farmer organizations. Data reporting may be required for issuance of licenses and permits.</i></li> <li>7) <i>States should make aquaculture jobs available to men and women and ensure occupational safety and security for all aquaculture workers.</i></li> </ol>
<p><b>Article 9.4.3</b></p> <p>States should promote efforts which improve selection and use of appropriate feeds, feed additives and fertilizers, including manures.</p>	<ol style="list-style-type: none"> <li>1) <i>States should establish research-based quality standards for feeds and feed additives and guidelines for their proper selection and use.</i></li> <li>2) <i>States should provide information on, and develop appropriate guidelines for the use of locally available materials as feeds.</i></li> <li>3) <i>States should support research and development on potential feed ingredients and alternative protein sources to minimize the use of fish meal and food fish in aquaculture.</i></li> <li>4) <i>States should establish and disseminate guidelines for the proper selection and use of fertilizers and manures.</i></li> </ol>

<p><b>Article 9.4.4</b></p> <p>States should improve effective farm and fish health management practices favouring hygienic measures and vaccines. Safe, effective and minimal use of therapeutants, hormones and drugs, antibiotics and other disease control chemicals should be ensured.</p>	<ol style="list-style-type: none"> <li>1) States should establish guidelines for effective farm and aquaculture health management, emphasizing preventive measures, good husbandry, and responsible use of chemotherapeutants.</li> <li>2) States should document the chemical nature, incidence and manner of use, and behavior of chemotherapeutants in aquaculture.</li> <li>3) States should establish and enforce appropriate regulations in the use of therapeutants, hormones, and antibiotics and disease-control chemicals in aquaculture.</li> <li>4) States should establish the authority for prescribing aquaculture drugs and ensure that qualified professionals are licensed for the purpose.</li> <li>5) States should establish a system or support the existing systems for monitoring and reporting disease outbreaks and informing aquafarmers of disease incidence and effective control measures.</li> <li>6) States should support research and development in aquaculture health management, including husbandry techniques, pathogenesis, and vaccines for important diseases.</li> </ol>
<p><b>Article 9.4.5</b></p> <p>States should regulate the use of chemical inputs in aquaculture which are hazardous to human health and the environment.</p>	<ol style="list-style-type: none"> <li>1) States should monitor, document and regulate chemical inputs in aquaculture, establish and enforce strict regulations on their use, and ban those that are hazardous to human health and the environment. Information on these banned chemicals must be widely disseminated.</li> </ol>



<p><b>Article 9.4.6</b></p> <p>States should require that the disposal of wastes such as offal, sludge, dead or diseased fish, excess veterinary drugs and other hazardous chemical inputs does not constitute a hazard to human health and the environment.</p>	<ol style="list-style-type: none"> <li>1) <i>States should establish guidelines and regulations to ensure proper disposal of wastes from aquaculture facilities – sludge, diseased or contaminated fish, offal, excess veterinary drugs, and other hazardous chemical inputs.</i></li> <li>2) <i>States should define standards for effluents especially those from intensive aquaculture farms and hatcheries.</i></li> <li>3) <i>States should require large-scale farms and assist groups of small-scale farms to include wastewater treatment (e.g., by means of settling ponds or biofiltration by seaweeds, mangroves, and filter feeding mollusks) and recycling in the farming system. Compliance may be required for the issuance of licenses and permits.</i></li> <li>4) <i>States should institute a system for communication and cooperation among aquafarmers and other users of water resources and potential users of sludge and other farm by-products.</i></li> </ol>
<p><b>Article 9.4.7</b></p> <p>States should ensure the food safety of aquaculture products and promote efforts which maintain product quality and improve their value through particular care before and during harvesting and on-site processing and in storage and transport of the products.</p>	<ol style="list-style-type: none"> <li>1) <i>States should monitor and document methods and practices in farming, harvesting, processing, storage, and transport of aquaculture products and institute a system for correction and improvement.</i></li> <li>2) <i>States should establish and implement guidelines for aquaculture practices that ensure food safety and high quality and value of aquaculture products. Guidelines can include the Hazard Analysis and Critical Control Points or HACCP.</i></li> <li>3) <i>States should support research and development on food safety including toxin diagnostics and monitoring.</i></li> </ol>

## CHAPTER V

### FOLLOW-UP ACTIVITIES

The *Regional Guidelines for Responsible Aquaculture in Southeast Asia*, as an elaboration of the CCRF Article 9 on Aquaculture Development, is only the second step in the long process toward the achievement of sustainable aquaculture in the region.

#### **The SEAFDEC-ASEAN Millennium Conference**

The *Regional Guidelines for Responsible Aquaculture in Southeast Asia* will be distributed to the Ministers of the ASEAN member countries and the various other stakeholders of aquaculture in the region during the SEAFDEC-ASEAN Millennium Conference in Bangkok, Thailand on 19-24 November 2001.

The Conference, called “Fish for the People” includes panel sessions on Aquaculture, Fisheries Management, Fish Trade, Fisheries Post-Harvest Technology, Fisheries Statistics, and Fisheries Cooperation. Preparations for the Aquaculture session of Conference included a year-long series of consultations done in parallel with those for the regionalization of the CCRF Article 9. The same Core Experts and government representatives identified aquaculture and environment issues important to the ASEAN member countries, assessed the status and existing policies regarding these issues, and recommended the necessary action to address the issues and ensure sustainable aquaculture in the region.

At this Conference, the Ministers of the ASEAN member countries will adopt a *Resolution on Sustainable Fisheries for Food Security for the ASEAN Region*. The Ministers resolve, without prejudice to the sovereign rights, obligations, and responsibilities of Countries under international law, to elaborate regional policies on fisheries, and undertake further collaborative actions and mutual assistance on the priority issues. States will formulate and apply regional guidelines to implement the provisions of the *Code of Conduct for Responsible Fisheries*, taking into account the diversity and specific social, economic, cultural, ecological, and institutional contexts of ASEAN fisheries.

#### **Role of Southeast Asian States**

Using the *Regional Guidelines* as basis, States may take necessary action to appropriately manage aquaculture within their jurisdictions. Southeast Asian States may do the following:

- Initiate necessary action identified in the *Regional Guidelines*.
- Prepare technical guidelines to further clarify the issues and specific subjects in the *Regional Guidelines*.
- Improve the national legal instruments.
- Promote the required policy and technical research to obtain needed or detailed information.



### **Role of the SEAFDEC Aquaculture Department**

The Aquaculture Department of SEAFDEC will continue to identify and implement priority programs in research, training and information dissemination, and technology verification and commercialization towards responsible and sustainable aquaculture in the region. SEAFDEC will continue to work with international research and development organizations and national and local governments, universities, farmer groups, and other stakeholders to promote responsible aquaculture. Moreover, SEAFDEC will disseminate widely, and build public awareness of, the *Regional Guidelines for Responsible Aquaculture in Southeast Asia*, together with the *Code of Conduct for Responsible Fisheries*, and the *FAO Technical Guidelines for Responsible Fisheries No. 5: Aquaculture Development*.

# Initial Environment Examination (IEE) for an Intensive Marine Shrimp Culture in Thailand

## Objectives

To minimize the impact of intensive marine shrimp farms on coastal environment.

## Target

Marine shrimp farm on coastal area of Thailand both on the Gulf of Thailand and Andaman sea.

## Methodology

In order to minimize the impact of intensive marine shrimp farm on coastal environment, the procedure would be as follows:

1. Farmers need to register the marine shrimp farms at Fisheries District office every year. For the registration process, the farmers have to submit farm layout, including culture pond, seawater storage, treatment area and drainage canal, culture method and effluent treatment technique.
2. Farmers need to report water quality in culture pond, farm sanitation and effluent (treated discharge water) every crop cycle to the Department of Fisheries.
3. Farmers would report above two topics in the format of Department of Fisheries.
4. This regulation will be activated in the year 2003.

## Effluent quality criteria

The farmers should discharge the effluent into coastal environment under the following effluent quality criteria:

BOD <sub>5</sub> <sup>20</sup>	≤	20 mg/L
Total ammonia-nitrogen	≤	1.1 mg/L
Total nitrogen	≤	4.0 mg/L
Total phosphorus	≤	0.4 mg/L
Total suspended solid	≤	70 mg/L
Hydrogen sulfide	≤	0.1 mg/L
pH		7.5 - 8.5



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## **CD-ROM PRODUCTION CREDITS**

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