AQUAMIMICRY

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Mimicking the "Mangrove Forest"
So the Ecosystem Can Help Raise Shrimp and Fish for Us
From Aquatic Animal Farming to Ecosystem Cultivation

An aquaculture concept using fermented rice bran to create natural food and a food web within the pond.

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PREFACE

This book begins with a simple but important question:
Why can mangrove forests sustain shrimp, fish, crabs, and an enormous diversity of life even though no one feeds them, no machines control every process, and no humans manage the ecosystem all the time?

The answer does not lie in any single organism. It lies in the whole "system."

Mangrove forests transform organic matter into food for microorganisms. Microorganisms and nutrients then become the foundation for plankton, benthic organisms, and small aquatic life before that energy continues upward to shrimp and fish.

Aquamimicry® therefore does not view fermented rice bran as merely another feed. It uses fermented rice bran as a starting point to stimulate biological processes, helping natural food and a food web develop inside the pond.

The purpose of this book is not to claim that people no longer need to manage anything. Instead, it proposes a different way of thinking: manage only what is necessary, and keep the farming load within the ecosystem's capacity.

"Do not feed faster than nature can digest the waste."

CONTENTS

CHAPTER 1

From a Shrimp Pond to an Ecosystem.

Modern aquaculture has developed in a direction where people increasingly control the system. We control feed, water, oxygen, stocking density, minerals, and waste. As production per unit area rises, the system becomes more dependent on machinery and external inputs.

Aquamimicry® asks the question in reverse. Instead of beginning with "How much feed do the shrimp need?" we begin with "How much food can this pond create and recycle?" This changes the entire way we think about farming.

The Biomimicry source document that provided the starting information emphasizes the creation of natural food, especially zooplankton and copepods, and uses fermented rice bran together with microorganisms to stimulate natural food in the pond. This is an important foundation that **Aquamimicry**® builds upon.

A Different Perspective
Rather than seeing a pond as a container holding shrimp, **Aquamimicry**® sees it as a community of living organisms - from bacteria and plankton to benthic organisms, shrimp, and fish. Every level must be connected for stability to emerge.

We do not raise shrimp one by one.
We build a system that helps raise the entire pond.

CHAPTER 2

The Mangrove Forest: The Model for **Aquamimicry®**
Mangrove forests are places where organic matter is continuously produced, accumulated, decomposed, and recycled. Leaves, branches, dead organisms, and waste are gradually transformed through the work of microorganisms and organisms at many trophic levels.

What **Aquamimicry®** seeks to mimic is therefore not the physical appearance of a mangrove forest, but its "function": nutrient cycling, creation of a food base, connection among living organisms, and the use of waste as raw material for the next level of life.

Nature Has No Feed Bin
Shrimp in nature do not wait for pellets to fall from the water surface. They search, forage, pick, and select food available around them. Creating a pond with diverse natural foods therefore restores natural feeding behavior to aquatic animals.

The System Comes Before the Animals.
Before stocking shrimp or fish, the biological foundation of the pond should be established first. The animals should enter a system that has already begun to function, not water with almost no food web.

Mimic nature - not its shape,
but the way nature works.

CHAPTER 3

Fermented Rice Bran: The Beginning, Not the End, of Food.

In the source information, rice bran fermented with microorganisms is used to create natural food, and copepod development is monitored after application. This reflects a role that goes beyond direct feeding.

For **Aquamimicry®**, fermented rice bran supplies energy and organic matter to the base of the system, creating an opportunity for microorganisms and small organisms to multiply and transform that energy into natural food.

The Pathway of Fermented Rice Bran
Fermented rice bran → microorganisms → nutrients and organic particles → plankton and small organisms → benthic organisms → shrimp and fish.

Success therefore should not be measured only by whether shrimp directly eat the bran. We should also ask whether fermented rice bran helps bring more life into the system, whether natural food is present in the water, whether the pond bottom supports living organisms, and whether aquatic animals can continue to find food.

Feed the Ecosystem - then let the Ecosystem help Feed the Shrimp.

CHAPTER 4

Build Natural Food Before Building Production.

The source information states that natural food is important for young shrimp and that, during the first 10-15 days, pellet feed may not yet be necessary if sufficient natural food is available in the pond. This principle shows that natural food can play a major role from the beginning of the production cycle.

Pond preparation under **Aquamimicry®** should therefore be viewed as "cultivating an ecosystem," not merely preparing water until its chemical parameters meet a target.

What to Look For

Look for diversity among small organisms, the emergence of zooplankton, the presence of benthic life, the response of fish and shrimp to feeding areas, and the pond's ability to process organic matter without signs of excessive accumulation.

When the natural food base is strong, external feed can shift from being the entire food supply to becoming only a supplementary source of energy when the system needs it.

Before stocking shrimp, create the shrimp's food inside the pond first.

CHAPTER 5

Waste Becomes a Resource When the System Can Handle It.

Many conventional systems try to collect and remove waste from the pond because excessive accumulation of organic matter can burden water quality. The original Biomimicry information itself includes settling ponds and waste-removal systems.

Aquamimicry® does not deny the risks of waste. Instead, it proposes another management hypothesis: reduce inputs so that waste is generated at a level the biological system can recycle.

The Critical Boundary.
Waste is not always a resource. If it is produced faster than microorganisms and other organisms can break it down, it immediately becomes a burden. The key is therefore to avoid producing waste beyond the system's carrying capacity.

When feed input is aligned with decomposition capacity, some organic matter can become a food base for microorganisms, benthic organisms, and the broader food web.

Do not feed faster than nature can digest the waste.

CHAPTER 6

From Food Chain to Food Web.

A real ecosystem does not operate as one straight line. One organism may eat many types of food while also serving as food for several other organisms. The relationship is therefore a “food web,” not a single food chain.

The more pathways available for energy transfer in a pond, the more options the system has. If one food source declines, aquatic animals may still use other sources.

A Conceptual Example.
Organic matter may be used by microorganisms. Some may become food particles, some may enter the plankton pathway, and some may settle to the bottom and be used by benthic organisms. Energy from these different routes can later converge again in shrimp and fish.

The goal of **Aquamimicry®** is therefore not to maximize one type of natural food, but to build diversity in the food base and strengthen connections among living organisms.

Food security comes from many food sources connected together.

CHAPTER 7

A Pond Concept That Reduces Dependence on Paddlewheel Aeration.

The original Biomimicry information still uses paddlewheel aeration and water circulation during some stages. Therefore, the concept of “no paddlewheel aeration” in this book is a further development and is not a direct conclusion from the original source document.

Reducing or eliminating paddlewheel aeration is possible only when the oxygen demand of the system does not exceed the pond’s natural oxygen-replenishment capacity. Lower stocking density, reduced external feeding, and reduced organic accumulation are therefore central principles.

Change the Question
Instead of first asking, “How many more paddlewheels do we need?” ask, “What is making this pond require so much oxygen?”

This approach requires serious monitoring of dissolved oxygen, especially before dawn, and should not be applied to high stocking densities without supporting data. The absence of paddlewheels is not the goal.

The goal is a system that does not depend on them more than necessary.

CHAPTER 8

Introducing Shrimp and Fish into the System.

Once natural food begins to develop, stocking aquatic animals becomes the act of connecting higher-level consumers to a system that already exists. Fish in the system can play roles beyond being harvestable products. Some species can use plankton, algae, organic matter, or food resources that shrimp do not directly utilize, allowing pond energy to flow through multiple pathways.

Density Must Follow the System.
Stocking too many animals quickly turns the ecosystem back into a system that depends heavily on external feed and oxygen. Animal numbers must therefore match the natural food base and the pond's capacity.

This concept does not mean "stock them and stop caring." It means "stock at a level the system can support, while people observe and adjust the balance."

We do not release shrimp into water.
We introduce shrimp into an ecosystem.

CHAPTER 9

Learn to Read the Pond:
Add When Lacking, Reduce When Excessive.

An ecosystem-based farmer must shift from being primarily a feeder to becoming an observer. The pond communicates through water clarity, color, odor, feeding behavior, the amount of natural food, pond-bottom condition, and water quality. The source information recommends checking copepods with a clear container or an Imhoff cone and using the amount of natural food as one factor in deciding when pellet feeding should begin.

This principle is valuable because feeding decisions are based on what actually exists in the pond.

When Natural Food Declines.
Support the food base carefully, and determine whether the decline is caused by increased consumption or by reduced food production within the system.

When Organic Matter Is Excessive.
Reduce inputs and give the system time to process what is already present. Adding more while the system is under a high load further increases oxygen demand.

The pond does not need us to add something every day.
The pond needs us to read it every day.

CHAPTER 10

Density and Carrying Capacity.

How much work nature can do for us depends on how much production we demand from nature. If the number of animals per unit area keeps increasing, a point will be reached where the system can no longer produce enough food or process waste quickly enough.

Carrying capacity is therefore a critical ceiling in **Aquamimicry®**. It should not be defined by one universal number for every pond because it depends on depth, surface area, temperature, natural-food abundance, pond-bottom quality, water circulation, and animal biomass.

A Guiding Principle
If we continually need to add more feed, more aeration, more water exchange, and more corrective products, this may indicate that we are pushing the system beyond its natural capacity.

Lower stocking density may appear to reduce production per unit area, but if cost, energy use, risk, and losses also fall, the more important question is the net return of the entire system.

Maximum production does not necessarily mean maximum profit.

CHAPTER 11

Aquamimicry® and Green Economics.

When the ecosystem performs some functions that would otherwise require machinery and external inputs, costs may have the opportunity to decline through lower feed, energy, water-management, and corrective-input requirements.

Green Feed : Use fermented rice bran as a starting point for building natural food and the foundation of the food web.

Green Cycle : Return organic matter and waste - at appropriate levels - to the biological cycle.

Green Ecosystem : Build relationships among microorganisms, plankton, benthic organisms, shrimp, and fish so that each level can make use of resources from another.

Green Economy : One unit of resource is reused through multiple levels of the ecosystem, so the value of an input does not end after a single feeding event.

The economics of **Aquamimicry®** therefore come from designing the system so nature does more of the work while people use energy and external inputs only where necessary.

Turn waste into life. Turn life into food. Turn the ecosystem into an economy.

CHAPTER 12

Let Nature Resume Its Role.

Ecosystem-based aquaculture does not mean leaving everything to chance. On the contrary, farmers must understand the system more deeply because, instead of controlling shrimp alone, they must read the relationships among all living organisms in the pond.

The human role changes from controlling everything to designing conditions, observing, and adjusting balance when necessary.

- When we feed too much, we reduce.
- When natural food declines, we help rebuild it.
- When the system is under load, we give it time.
- When the system is functioning well, we do not disturb it without reason.

Aquamimicry® in One Sentence.
Build an ecosystem strong enough, then let the ecosystem help raise the shrimp and fish for us. This is not a return to traditional farming. It is the use of ecological understanding to redesign aquaculture so that it becomes simpler, uses fewer resources, and works more closely with nature.

Mimic Nature. Build the Ecosystem.
Let the Ecosystem Feed the Shrimp.

SOURCE NOTE

Note on Sources and Development.

This draft book was prepared using the document "Nature-Based Shrimp Farming (Biomimicry)" by the Coastal Aquaculture Research and Development Division, Department of Fisheries, Thailand, as foundational information - particularly its concepts concerning natural-food creation, fermented rice bran, microorganisms, copepods, feeding, and system management.

The concepts of mimicking mangrove processes, reducing dependence on paddlewheel aeration, allowing the ecosystem to take a greater role in raising shrimp and fish, and the Green Aquaculture framework are developments presented within the **Aquamimicry®** framework for this new book. They should not be interpreted as direct conclusions of the Department of Fisheries source document.

This edition is a conceptual manuscript. Field data, water-quality measurements, animal density, survival, production, and dissolved-oxygen monitoring should be added before it is used as a practical manual or technical recommendation.

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