ENVIRONMENTAL LIFE CYCLE ASSESSMENT OF THAI SHRIMP PRODUCT

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Shrimp Production System in Thailand

Rationale

Research Objectives

Methodology

Results

Concluding Remarks
SHRIMP PRODUCTION SYSTEM IN THAILAND

TRAWLING: WILD BROODSTOCK CAPTURE
SHRIMP PRODUCTION SYSTEM (CONT)

HATCHERY: POST-LARVAE REARING
SHRIMP PRODUCTION SYSTEM (CONT)
FARMING: GROW-OUT FROM POST-LARVAE TO ADULT SHRIMPS

1. Pond Construction
SHRIMP PRODUCTION SYSTEM (CONT)

FARMING: GROW-OUT (CONT)

2. Pond Preparation
SHRIMP PRODUCTION SYSTEM (CONT)

FARMING: GROW-OUT (CONT)

3. Post-Larvae Stocking
SHRIMP PRODUCTION SYSTEM (CONT)

FARMING: GROW-OUT (CONT)

4. Grow-Out
SHRIMP PRODUCTION SYSTEM (CONT)

FARMING: GROW-OUT (CONT)

5. Harvest
SHRIMP PRODUCTION SYSTEM (CONT)

FARMING: GROW-OUT (CONT)

6. Pond Preparation After Harvest
LIFE CYCLE OF SHRIMP PRODUCTION

- Trawling
- Hatchery
- Farming
- Processing
- Storage
- Wholesaler
- Retailer
- Consumer
- Waste Disposal

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RATIONALE

Negative image of Thai shrimp (black tiger prawn)

Environmentally unsustainable aquaculture practices

Interactions of aquaculture and fisheries systems

Import control measures imposed by importing countries
Is it OK to eat tiger prawns? Read this before you answer.

SOURCE: The Guardian (19.06.03)
RESEARCH OBJECTIVES

(1) Development of LCA methodology applicable to shrimp production in Thailand

(2) Application of the LCA methodology to systematically evaluate and quantify the environmental interventions of block-frozen shrimp production chains
METHODOLOGY

Specific types of shrimp farms, with diverse culturing techniques and farming management systems, were selected in different areas.

Site visits of hatcheries, farms, and walking through the processing line.

All environmental interventions in every stage along the block-frozen shrimp production chains including transportation were identified.
# RESULTS FROM QUALITATIVE LCA

<table>
<thead>
<tr>
<th>SUBSYSTEMS</th>
<th>KEY ISSUES</th>
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<tbody>
<tr>
<td>Trawling</td>
<td>Marine ecosystem, Energy use</td>
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<tr>
<td>Hatchery</td>
<td>Water use</td>
</tr>
<tr>
<td>Shrimp Farm</td>
<td>Wastewater, Energy use</td>
</tr>
<tr>
<td></td>
<td>Land use impacts</td>
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<tr>
<td></td>
<td>Ecotoxicity, Biodiversity</td>
</tr>
<tr>
<td>Processing Plant</td>
<td>Energy use, Water use</td>
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<tr>
<td>Transportation</td>
<td>Air emissions, Ecotoxicity</td>
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### Qualitative Life Cycle Impact Assessment of Five Different Farming Systems

<table>
<thead>
<tr>
<th>IMPACTS</th>
<th>Bio &amp; CoC</th>
<th>(Convt &amp; CoC)</th>
<th>(Probiotic)</th>
<th>(Ecological)</th>
<th>(Organic)</th>
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<td>3</td>
<td>4</td>
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<tr>
<td>Water use</td>
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<tr>
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<tr>
<td>Wastewater</td>
<td>3</td>
<td>4</td>
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<td>1</td>
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<tr>
<td>Ecotoxicity</td>
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<td>4</td>
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<tr>
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<td>13</td>
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<td>9</td>
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</tbody>
</table>

**Note:** CoC is the Code of Conduct for Marine Aquaculture; 5 is the highest impacts; and 1 is the lowest impacts.
PRELIMINARY QUANTITATIVE LCA RESULTS

Bio & CoC Farm

Functional unit = 1.8 kg of block-frozen shrimp


[Please visit DOF website for more details of CoC, http://www.thaiqualityshrimp.com]
Bio & CoC Farm: Excluding Transportation

- Abiotic depletion
- Global warming (GWP 100)
- Ozone layer depletion
- Human toxicity
- Fresh water aquatic ecotoxicity
- Marine aquatic ecotoxicity
- Terrestrial ecotoxicity
- Photochemical oxidation
- Acidification
- Eutrophication

Legend:
- Storage in Plant
- Frozen Processing
- Bio & CoC Farm
- Hatchery
- Shrimp Trawling

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Bio & CoC Farm: Excluding Transportation and Storage

Abiotic depletion
Global warming (GWP 100)
Ozone layer depletion
Human toxicity
Fresh water aquatic ecotoxicity
Marine aquatic ecotoxicity
Terrestrial ecotoxicity
Photochemical oxidation
Acidification
Eutrophication

- Frozen Processing
- Bio & CoC Farm
- Hatchery
- Shrimp Trawling

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CONCLUDING REMARKS

The environmental impacts associated with shrimp aquaculture are dependent on the characteristics of the site, the choice of culturing practices and management strategies.

Practical approaches permitting the quantification of environmental impacts attached to aquaculture need to be further investigated.

Application of LCA studies of different farming systems and sites will identify the practices with the least environmental impacts to make the shrimp industry more sustainable.
THANK YOU FOR YOUR ATTENTION