Development of Better Management Practices (BMPs)
– The catfish case study –

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What is better management practices (BMPs)?

- A set of guidelines that are developed
  - based on population based risk factor studies,
  - in consultation with the practitioners and relevant stakeholders
  - and on the evaluation of current practices.
Benefits of adopting BMPs

- Reduction and/or a minimisation of disease occurrence,
- Improved growth performance,
- Decreasing cost of farming,
- Improved environmental conditions,
- Minimise impacts on the local environment,
- Attain food quality standards,
- Improve marketability of the produce, and
- Facilitate sustainability.

Example: Shrimp case in India
How BMPs differ from others?

• BMPs:
  – Science-based tools developed base on risk factor studies
  – Goal: sustainable aquaculture
• Extension messages:
  – Focusing more on production
• Good Aquaculture Practices (GAPs)
  – Addressing mainly food safety issues.

Catfish farming in the Mekong Delta, Vietnam

• Species:
  – Pangasianodon hypophthalmus
The catfish farming sector at a glance

• Yield: 300 to 400 tonnes/ha/crop; the highest recorded for any primary production sector in the world
  – It is a farming system that essentially occupies approximately 5,400 ha of land but produces for example as much as 65 percent of the total aquaculture production in Europe

• Pond depth: 4 to 4.5 m, with regular water exchange from the Mekong River and/or its tributaries.
• Provides many livelihood opportunities to poor rural communities, particularly women, significantly bypassing that seen elsewhere in aquaculture.
• The farming system is blessed with an adequate water supply through the year
  – obligatory to ensure that the water source is not overly nutrient loaded bringing about negative impacts on all users of this common, valuable resource.
• Horizontally integrated, with specialised hatchery production, fry to fingerling/ nursery rearing and grow-out phases

• Almost totally destined for export, being an acceptable substitute for “white fish’, particularly for the Western palate/ taste, thereby catering to a “niche” market.
Issues

- Husbandry practices
- Seed quality
- Excessive dependence on trash fish as a feed resource
- Ad hoc use of antibiotics and other banned chemicals threatening both food safety and access to export markets on which the industry depends
- Increasing incidence of disease related losses
- Environmental degradation (e.g. water quality), and
- Fish product quality and food safety/traceability.

The project

- Team:
  - Fisheries Victoria, DPI Vic, Australia
  - NACA
  - Research Institute for Aquaculture No2 (RIA2) and Can Tho University, Vietnam
- Funding agency:
  - Australian Agency for International Development (AusAID)
Steps...

- Field surveys on catfish farming practices through farmers consultation
- Identification of risk factors (risk assessment)
- Results of field survey
- Stakeholders consultation

On-farm extension
- Regular visits
- Consultation with clusters

Formation of farmers clusters/demonstration units

Selection of leaders and potential extensionists for BMPs trials

Dissemination

Develop interventions (draft BMPs)

Testing of interventions (pilot scale)

Validation of BMPs

www.enaca.org
1. The field survey...

Three sub-sectors...

<table>
<thead>
<tr>
<th>Sub-sector</th>
<th>No. of farms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hatchery</td>
<td>47</td>
</tr>
<tr>
<td>Nursery</td>
<td>45</td>
</tr>
<tr>
<td>Grow-out</td>
<td>84</td>
</tr>
</tbody>
</table>
• All data are managed in a custom-made database.
• Descriptive analysis
• Correlation analysis
2. Risk assessment...
Risk-based BMP logframe

Level of risk
• High
• Significant
• Moderate
• Low

BMP response
• High risk = Mandatory BMP
• Significant risk = Recommended BMP
• Moderate risk = Optional BMP
• Low risk = No BMP required

BMP Outputs
• BMP project report
• Funding body
• Literature (peer review)
• Government
• BMP extension products
• Fact sheets (standard templates)
• Web-pages
• BMP implementation
• Cluster delivery
• Next phase

BMP Categories
• Based on generic framework
• Determined from risk assessment matrix

Risk register

<table>
<thead>
<tr>
<th>BMP</th>
<th>Risk Category</th>
<th>Risk Category Description/Sub-Category</th>
<th>Specific Risk</th>
<th>Description of Specific Risk</th>
<th>Risk No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community Consultation</td>
<td></td>
<td>Community rejects construction of new farm</td>
<td></td>
<td>Conflict with community over use of site and/or establishment of farm</td>
<td>1.11</td>
</tr>
<tr>
<td>Water Supply</td>
<td></td>
<td>Establishment of farm exceeds carrying capacity of water body</td>
<td></td>
<td>Water body is fully/over exploited</td>
<td>1.21</td>
</tr>
<tr>
<td>Farm Design</td>
<td></td>
<td>Poor farm design limits ability to farm fish successfully</td>
<td></td>
<td>Poor pond and water reticulation system design lead to reduced productivity and environmental impacts</td>
<td>1.31</td>
</tr>
<tr>
<td>Farm is vulnerable to extreme tides, rain, weather</td>
<td></td>
<td>Farm is vulnerable to extreme tides, rain, weather</td>
<td></td>
<td>The pond banks are not high enough to prevent overflow in heavy rain</td>
<td>1.32</td>
</tr>
<tr>
<td>Natural Resource Use</td>
<td>Land</td>
<td>Poor/unsustainable land use practices degrade the environment and/or impact public amenity</td>
<td></td>
<td>Poor land use impacts surrounding environment and/or prevents other uses</td>
<td>1.41</td>
</tr>
<tr>
<td>Site Selection &amp; Farm Design</td>
<td>Water</td>
<td>Poor/unsustainable water abstraction practices from river/stream/channels degrades environment and/or impacts public amenity</td>
<td></td>
<td>Poor land use impacts surrounding environment and/or prevents other uses</td>
<td>1.42</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Poor/unsustainable water use from surrounding farms negatively effects farm increased</td>
<td></td>
<td>No BMPs used by surrounding farms</td>
<td>1.43</td>
</tr>
</tbody>
</table>
## BMP Key Categories

- Site Selection & Farm Design
- Farm Management
- Culture System Preparation
- Seedstock Supply & Stocking
- Feed Management
- Water Management
- Waste Management
- Fish Health Management & Biosecurity
- Harvest & Post-harvest
- Record Keeping
- Marketing & Finance
- Communication & Training
- Climate Change

### Risk rating

<table>
<thead>
<tr>
<th>BMP Category &amp; Farm Design</th>
<th>Risk Number</th>
<th>Risk Rating</th>
<th>Farm Risk</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Selection &amp; Farm Design</td>
<td>1.11</td>
<td>1 5 6</td>
<td>M</td>
<td>Community rejects construction of new farm</td>
</tr>
<tr>
<td></td>
<td>1.21</td>
<td>1 4 3</td>
<td>M</td>
<td>Establishment of farm exceeds carrying capacity of water body</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Poor farm design limits ability to farm fish successfully</td>
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<td></td>
<td>1.32</td>
<td></td>
<td></td>
<td>Poor sustainable land use practices degrade the environment and/or impact public amenity</td>
</tr>
</tbody>
</table>

Risk Rating:
- H: High
- S: Significant
- M: Moderate
- L: Low

Risk Number:
- 1 (rare) to 5 (almost certain)
## Risk Ranking Matrix

<table>
<thead>
<tr>
<th>Likelihood</th>
<th>Insignificant 1</th>
<th>Minor 2</th>
<th>Moderate 3</th>
<th>Major 4</th>
<th>Catastrophic 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Almost Certain 5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>Likely 4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>Possible 3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Unlikely 2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Rare 1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

## Risk ranking profile

<table>
<thead>
<tr>
<th>Risk Ranking Profile</th>
<th>BMP Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>8-10</td>
<td>High Risk</td>
</tr>
<tr>
<td>7</td>
<td>Significant Risk</td>
</tr>
<tr>
<td>5-6</td>
<td>Moderate Risk</td>
</tr>
<tr>
<td>&lt;5</td>
<td>Low Risk</td>
</tr>
</tbody>
</table>

**BMP Response**
- **Mandatory**
- **Recommended**
- **Optional**
- **Not required**
Draft BMPs

- 5 parts
  - General background to BMPs
  - BMPs for grow-out farms
  - BMPs for nurseries
  - BMPs for hatcheries
  - Way forward

Each of the BMPs – Example 1

- Results of the field survey
- Identify risks
- Recommend BMPs

- On average 30% of water is replenished daily at least during the last two months of the production cycle, and that the productivity was not related to the amount and or the frequency of exchange water.

- Production costs/inefficient of water use
**BMP 8. Water exchange**

- Reduce the water exchange rate and frequency to by 5% each time, in the interim, as an interim measure, and to be further evaluated when more scientific data become available in due course.
- Introduce a water intake and discharge schedule/calendar for all farms in each 2 km stretch of the river.
- Evolve a simple communication strategy, such as by SMS, to inform all farmers of the group of discharge and intakes.
- Filter/screen the intake water.
- Endeavour to have a reservoir tank/canal to store water before discharge.

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**Example 2**

- Diseases occur mainly during the rainy season.
- Dead fish are sold to cage culture farmers (pacu fish).
BMP 10. Disease management

- Schedule stocking to avoid rainy season???
- Record all clinical signs and progression of development and size of the affected stock
- Remove and safely dispose all dead fish (preferably cooked before disposal – and not selling to other fish farmers).
- Submit moribund samples for disease diagnosis
- Do not use chemicals without understanding the primary etiology of the disease (for example - for yellow coloration in catfish - this condition could be mainly a non-infectious condition. No chemical will help to solve the underlying problem.

Example 3

<table>
<thead>
<tr>
<th>Chemical used for pond bottom treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anti-bacteria</td>
</tr>
<tr>
<td>BKC</td>
</tr>
<tr>
<td>Chlorine</td>
</tr>
<tr>
<td>CuSO₄</td>
</tr>
<tr>
<td>TCCA</td>
</tr>
<tr>
<td>Dipterex</td>
</tr>
<tr>
<td>Ensova</td>
</tr>
<tr>
<td>Formalin</td>
</tr>
<tr>
<td>KMnO₄</td>
</tr>
<tr>
<td>NPK fertilizer</td>
</tr>
<tr>
<td>Saponin</td>
</tr>
<tr>
<td>TCA</td>
</tr>
<tr>
<td>TCCA</td>
</tr>
<tr>
<td>Thiodan</td>
</tr>
<tr>
<td>Viridime</td>
</tr>
<tr>
<td>Virkon</td>
</tr>
<tr>
<td>Yucca</td>
</tr>
<tr>
<td>Zeolite</td>
</tr>
</tbody>
</table>

BMP 1. Pond bottom treatment

- Remove bottom sludge preferably after every harvest, compulsory after every second harvest.
- Develop strategies for using the sludge as an income generator.
- Apply lime, in recommended quantities, during pond preparation
Example 4

**BMP 18. Broodstock management**

- Diet: balanced amino acids and fatty acids (preferably fish meal of marine origin)
- Sex ratio 1:1 to 1:9
- Number of broodstock ranged from 240 -11,000
- Broodstock are fed with either grow-out or high protein content diet (upto 60% protein)
- Effective breeding number: try to maintain at about 500
- No need to keep large amount of broodstock

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**Market aspects**

Current marketing:
- Producers (Small scale farmers) → Processors → Importers
  - Price dictated by processor
  - Price established

BMPs/ Clusters marketing:
- Producers (Small scale farmers) → Importers → Processors
  - Price negotiated
Way forward
– Pathway to BMP adoption –

• To “fine tune” the draft BMPs before the stakeholders
• Among the stakeholders select, preferably from each District, farmers who would volunteer to have demonstration farms that would adopt BMs, almost immediately, and stick to the guidelines agreed upon.
• The Demonstration farms will be available for visits by any other stakeholder, observe what is ongoing and discuss details with the operator/farmer
• The information arising from the demonstration farms will be readily available to all, and will be utilized to demonstrate the impacts of adoption of BMPs to other stakeholders, such as information related to:
  – disease occurrences,
  – productivity,
  – cost of production,
  – economic viability,
  – market price obtained

Way forward
- Pathway to formation of clusters -

• Do the tra catfish farmers agree that a “Cluster/Associations/Cooperative” approach is required to sustain the industry and meet the modern day demands of markets?
• What should be the nature of “Cluster/Associations/Cooperative”
  – Should each “Cluster/Association/Cooperative” be restricted to a District/Sub District or a defined number of farms along a pre-determined length of the river
  – How would you make the “Cluster/Association/Cooperative” functional?
  – Prepare guidelines for the conducting the day-to-day affairs of the “Cluster/Association/Cooperative”
  – Proceed to obtain registration with the appropriate governmental body