Inventory and Monitoring of Aquaculture Environment

Requests of Aquaculture

- Water quality (temp, sal, DO, Nutrien) observation.
- Real time observation.
- Multi layer observation.
- Cheap as much as possible.
- Small as much as possible.

Marine fish Cage Aquaculture Gondol, Bali
Inventory and Monitoring of Aquaculture Environment

System diagrams

Mail server
Database server

Usuya15
Seawater temp.
1m: 19.7 (0.2)
5m: 19.9 (0.2)
10m: 19.7 (-0.2)
15m: 19.7 (-0.4)
20m: 19.7 (-0.4)

Date: 09/30
Time: 14:29
Air: 20.8°C (2.3)
Volt: 6.17V

Alerts

mobile
Inventory and Monitoring of Aquaculture Environment

Relationship between water temperature and no. of fish dead
Inventory and Monitoring of Aquaculture Environment

Relationship between water temperature and no. of fish dead
Inventory and Monitoring of Aquaculture Environment

Freshwater fish Cage Aquaculture
Cirata Reservoir, West Java

- Total area: 6,200 ha
- Max. Depth: 80 m

<table>
<thead>
<tr>
<th>Parameter</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td>80,405</td>
<td>113,231</td>
<td>141,861</td>
<td>145,302</td>
<td>133,492</td>
<td>154,875</td>
</tr>
<tr>
<td>Number of cages</td>
<td>4,474</td>
<td>1,821</td>
<td>2,388</td>
<td>2,512</td>
<td>2,541</td>
<td>3,142</td>
</tr>
</tbody>
</table>

May 2011

June 2011

July 2011

August 2011

- Total area: 6,200 ha
- Max. Depth: 80 m
Modeling of Site Selection

Identification of important parameters for aquaculture

Data Collection

Identification, obtaining and preparing database

Literature and experts’ opinions

Data processing

MCE process (AHP)

GIS

GIS models for site selection

Suitability models

Sensitivity analysis

Final Suitability Map

Verification

Sensitivity/verification

Final suitability map
Modeling of Site Selection

GIS based model for seaweed aquaculture site selection in Sumbawa, West Nusa Tenggara, Indonesia.
GIS based model for seaweed aquaculture site selection in Sumbawa, West Nusa Tenggara, Indonesia
## Modeling of Production Carrying Capacity

### Laut Tawar Lake ACC based on phosphorous (P)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Nilai</th>
</tr>
</thead>
<tbody>
<tr>
<td>P in pelet</td>
<td>0.71%</td>
</tr>
<tr>
<td>kg P in 1 ton pelet</td>
<td>7.1</td>
</tr>
<tr>
<td>FCR</td>
<td>1.47</td>
</tr>
<tr>
<td>P food</td>
<td>10.42</td>
</tr>
<tr>
<td>P inside fish dry weight</td>
<td>44.00%</td>
</tr>
<tr>
<td>Water contaminant in fish</td>
<td>80.71%</td>
</tr>
<tr>
<td>P in fish wet weight (kg/ton ikan)</td>
<td>0.08492</td>
</tr>
<tr>
<td>P into the water (kg/ton fish production)</td>
<td>10.34</td>
</tr>
<tr>
<td>Lake ACC (ton/yr)</td>
<td>63333</td>
</tr>
</tbody>
</table>

ACC approach based on Dillon and Rigler (1974)

Total surface area of the lake: 5742 ha
The concept of BLUE ECONOMY:
1. **Integrated**: Economic-environmental, central-local
2. **Region/cluster-based**: Potential Economic Zone
3. **Zero Waste**: Without waste/pollution-free
4. **Creative and Innovative Investment**
5. **Sustainable**: Maintaining a balance between utilization of natural resources and environment, and also between the production and consumption

**Integrated Aquaculture - IMTA**

**IMTA**

*Modeling Site Selection*

*Climate Change*

*FAO, 2010*
Integrated Aquaculture - IMTA

- **Marine fishes**: Grouper (*Epinephelus fuscoguttatus*); Rabbitfish (*Siganus guttatus*)
- **Shellfish**: Pearl (*Pinctada spp.*)
- **Seaweed**: *Kappaphycus alvarezii* and *Eucheuma spinosum*
FUTURE PERSPECTIVE

Abiotic factors
Climate impact
Gov. Policy & Mgmt
Human dimension

Ecosystem Based Aquaculture Management

Carrying capacity estimation
Aquaculture
IMTA

Sustainable Aquaculture production
I Nyoman Radiarta\(^1\); Husnah Samhudi\(^1\)
Widyatmoko\(^2\), Gede Ari Yudasmara\(^3\)

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