Aquaculture site selection plan in Finland

- Results of a national site selection project
- Coexist, Governance, LCA
- Aquabest

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Knowledge-based solutions, for sustainable choices
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## Production 2011

<table>
<thead>
<tr>
<th></th>
<th>Sweden</th>
<th>Finland</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Production</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(million kg)</td>
<td>12.0</td>
<td>11.3</td>
</tr>
<tr>
<td><strong>Value of production,</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(million €)</td>
<td>36.8</td>
<td>47.1</td>
</tr>
<tr>
<td><strong>Share of rainbow trout of the production</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>89.8 %</td>
<td>87.6 %</td>
</tr>
<tr>
<td>The rest mainly</td>
<td>arctic char</td>
<td>whitefish</td>
</tr>
<tr>
<td><strong>Number of farms (food fish)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>79</td>
<td>178</td>
</tr>
<tr>
<td>of which in the Baltic Sea coast</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>18</td>
<td>111</td>
</tr>
<tr>
<td>(only rainbow trout)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Farms producing more than 100 tons/a</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>only few</td>
</tr>
<tr>
<td>Producing 95 % of the Swedish production</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Statistics Sweden (SCB), Statistics Finland (SVT))
Swedish Production 1983-2011

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Swedish production and number of farms in 2011

Annual production (tons) / number of farms

Counts with production >100 tons:
Norrbotten
Västerbotten
Västernorrland
Jämtland
Dalarna
Värmland
Västra Götaland
Skåne

Statistics Sweden (SCB)
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### Swedish application system

**Consultations**
- County Administrative Board
- Regulatory authority (municipality)
- Individuals specially affected by the project

**Environmental impact?**
- County Administrative Board makes a decision whether an application can be prepared and sent forward

**Broader Consultations**
- County Administrative Board
- Supervisory/regulatory authorities
- Individuals specially affected by the project
- Other state authorities, municipalities, organizations, groups affected by the project

**Application with MKB**
- Application
- MKB (Environmental Impact Description) including report of consultations
- Information to the general public

**Decision**
- County Administrative Board decides if MKB is valid
- County Administrative Board accepts the application

### Finnish application system

**Application**
- Regional State Administrative Agencies

**Possible supplements and consultations**
- Regional State Administrative Agencies
- Centre for Economic Development, Transport and the Environment management (ELY-central)
- Information to general public

**Comments**
- Regulatory authority (ELY-center, 2 departments)
- Municipality
- Individuals specially affected by the project

**Possible consultations**
- Regulatory authority (ELY-center)
- Regional State Administrative Agencies

**Decision**
- Regional State Administrative Agencies

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The Swedish governance practice*:

- Large farms in Sweden (over 1000 tons) in the lake area,
- In the sea area the capacity of the farms owned by Finns are 400-600 tons
- Farm sites are excellent, oligotrophic areas, depth 40-60m, no registered complains although the farms are located near shores
- More difficult to get permits for sea than for lake areas,
  - for sea areas permits are usually for 10-15 years,
  - for lake areas permits are for an indefinite time
- Spatial plan is generally not yet in use in Sweden as it is going to be in Finland in 2013

*interview of a Chief executive of a Fish farming enterprise in Åland islands
Finnish farmers going "to exile" into Sweden*

- Over 5 million kg annually "Finnish" production in Sweden
- Big farms, big plans:
  "We have now a million kg farm but it is planned to produce 4 million kgs on that farm in the near future. This plan is prepared in understanding with the local environmental authorities and with their consultative help."
- The Production exported to Finland
  "There is no market for big rainbow trout in Sweden"
- Sometimes the fish goes first to Estonia to be processed before exportation to Finland

* The chief executive of a Finnish fish farming company
Finnish farmers going ”to exile” into Sweden*

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Finnish paradox

- The Finnish environmental permit policy has not benefited the ecological status of the sea, but moved the production volumes and employment opportunities to other locations in the Baltic Sea drainage area.
- While the Swedish society seems to be able to recognize a development opportunity for the aquaculture in Sweden offered by the Finnish fish farmers, the Finnish society does not recognize the danger to lose their fish farmers.
- For the Finnish governance the road to sustainable development for aquaculture seems to be unknown and, thus, a paradox where the suffering of both livelihood and the environment is caused.
LCA based comparation of alternatives

- Standardised method
- Different products and services can be compared,
  - for example different food stuffs or food production branches like aquaculture products versus other meat products
- Impact size and classes may help to find points to be developed
Knowledge-based solutions, for sustainable choices

- Fishing

- Soy, wheat, rape seed production
  - Processing: Soy meal & concentrate
  - Wheat flour
  - Rape seed oil

- Feed manufacturing
  - Smolt production

- Fish meal and oil production

- Materials production
  - Fish farming
  - Fertilisers
  - Pesticides
  - Antifouling

- Electricity production
- Heat production
- Fuels production
- Chemicals production
BAU: results

- Energy consumption (Gj per 1,000 kg of fish)

- Soy products: 2 GJ
- Wheat: 1 GJ
- Fish meal and oil: 10 GJ
- Other feed raw materials: 0.5 GJ
- Fish feed manuf.: 2 GJ
- Hatchery: 0.5 GJ
- Fish farming: 1 GJ
- Transports: 0.5 GJ
- Packages: 0.5 GJ

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Comparison: energy consumption

Knowledge-based solutions, for sustainable choices
Comparison: climate and eutrophication

Knowledge-based solutions, for sustainable choices
LCA Conclusions

- Present system:
  - Decrease nutrient load from fish farming (practically & technically)
  - Use renewable energy and utilize organic wastes maximally
  - Be awake to the environmental impacts of feed raw materials production

- Net loading: present system and...
  - Result is very sensible for the end use of LVF: if just replaces fish used in fur animal feeding \(\Rightarrow\) net effect \(\leq 0\)
  - Minimise fuel consumption of LVF fishing

- Offshore: see present system

- BS feed: see present system, and...
  - Minimise fuel consumption of fishing
  - A new alternative \(\Rightarrow\) composition of the fish feed is not known yet \(\Rightarrow\) may (significantly) affect to the final results
General conclusions

• The most sustainable way to produce animal protein is fish farming using Baltic Sea Feed in more open farm locations
• The environmental impacts can be smaller compared to chicken, cow or pig meat production
• Fish as food has positive effects on national health status
• There are no direct production subsidies for fish farming – world market prices in use
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Thank you for your attention

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