ROMANIAN AQUACULTURE
OPPORTUNITIES, REQUIREMENTS AND ECOLOGICAL
DRAWBACKS FOR THE DEVELOPMENT OF MARINE
AQUACULTURE ON THE ROMANIAN LITTORAL

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Romania is the twelfth country of Europe from the geographical point of view, having an area surface of 238,391 square km, of which 87% (207,372 square km) represent rural areas and 13% represent urban areas (31,018 square km). There are 400,000 ha of natural lakes and ponds, man-made reservoirs, including the Danube Delta; 84,500 ha of fish farms; 15,000 ha of fish nursery areas; 66,000 km of rivers of which 18,200 km are in the mountain area; 1,075 km are located in the lower part of the Danube. Romania has a coastline along the Black Sea of abound 250 km, while the exclusive economic zone covers 30,000 square kilometers.
HISTORY AND GENERAL OVERVIEW

Although the share of the fisheries sector to the Gross Domestic Product (GDP) was of only 0.0054% in 2005, this sector is important for the national economy mostly due to its social role, to its potential as a food-source, to its wetlands and to the biodiversity of the Romanian waters. The fisheries sector includes aquaculture, marine and inland fishing activities, as well as the related processing and marketing activities. Romania’s main fishery production component is represented by aquaculture, followed by the inland fisheries. The fisheries activities along the coastline of the Black Sea remain limited compared to the inland fisheries.
In Romania, the structure of aquaculture population is dominated by cyprinids, representing almost 85% of the total production, followed by trout, perch, pike, catfish and fresh water sturgeons (15%). The system traditionally used in Romanian aquaculture is extensive or semi-intensive, mainly based on cyprind policulture rearing in ponds.
FARMING SYSTEMS DISTRIBUTION AND CHARACTERISTICS – marine aquaculture

ROMANIAN BLACK SEA

- Coast length: 245 km (6%)
- Shelf: ~30,000 km² (16%)
- EEZ (1986): 25,000 km²

BLACK SEA

- Turbot farm
- Molusks farm
SECTOR PERFORMANCE

PRODUCTION

- A. brama
- C. carpio
- C. auratus gibelio
- Rutillus spp.
- C. idellus
- H. molitrix
- H. nobilis
- E. lucius
- S. glanis
- P. fluviatilis
- S. lucioperca
- T. tinca
- A. alburnus
- S. erytrophthalmus
- Acipenseridae
- P. spatula
- A. anguilla
- Osteichthyes nei
- O. mykiss

Tonnes
Fish consumption in the period of 2001 - 2005
(kg/person/year)

Kg/pers/year

Year

2001 2002 2003 2004 2005

2,60 3,20 3,50 3,90 4,50
Pro Arguments (1) - opportunities

- The existence of an enormous water surface (volum), which hasn’t been used until the present;
- The presence of waters naturally “enriched“ with nutrients;
- The absence of toxic algae in the phytoplankton of the Romanian littoral;
- The presence of available ecological niches.
Pro Arguments (2) - opportunities

- the existence of indigenous and non-indigenous species with high ecological plasticity and high nutritional value;
Pro Arguments (3) - opportunities
- support for the sustainment of threatened marine organisms populations
The materialization of the zoning of mollusc waters (suitable not only for molluscs, but also for other resources, such as macrophyte algae) - approved through GD no. 201/22.03.2002, for the approval of the Technical norms regarding the quality of mollusc waters, modified and completed by GD no. 467/2006 (according to the WATER QUALITY REQUIRED FOR REARING MOLLUSCS DIRECTIVE 2006/113/EC OF THE EUROPEAN PARLIAMENT AND COUNCIL of 12 December 2006 requirements).

To be implemented in the future:
## Pro and Against Arguments (1) - requirements and constraints

<table>
<thead>
<tr>
<th>Factor</th>
<th>Good</th>
<th>Average</th>
<th>Bad</th>
<th>Romania</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposure</td>
<td>partial</td>
<td>sheltered</td>
<td>exposed</td>
<td>exposed</td>
</tr>
<tr>
<td>Waves</td>
<td>≤1 m</td>
<td>From 1 to 3 m</td>
<td>≥3 m</td>
<td>&gt; 3 m</td>
</tr>
<tr>
<td>Depth</td>
<td>&gt; 30 m</td>
<td>From 15 to 30 m</td>
<td>&lt; 15 m</td>
<td>≥15 m</td>
</tr>
<tr>
<td>Currents</td>
<td>strong</td>
<td>moderate</td>
<td>weak</td>
<td>strong</td>
</tr>
<tr>
<td>Pollution</td>
<td>absent</td>
<td>low</td>
<td>high</td>
<td>low</td>
</tr>
<tr>
<td>Max. temperature</td>
<td>From 22 to 24°C</td>
<td>From 24 to 27°C</td>
<td>&gt; 27°C</td>
<td>From 24 to 27°C</td>
</tr>
<tr>
<td>Temperatura min.</td>
<td>12°C</td>
<td>10°C</td>
<td>&lt;8°C</td>
<td>&lt;8°C</td>
</tr>
<tr>
<td>Average salinity</td>
<td>From 25 to 35</td>
<td>From 15 to 25</td>
<td>&lt;15</td>
<td>From 15 to 19</td>
</tr>
<tr>
<td>Fluctuation of salinity</td>
<td>&lt;5</td>
<td>From 5 to 10</td>
<td>&gt; 10</td>
<td>&lt;5 (central - South</td>
</tr>
<tr>
<td>Dissolved oxigen (%)</td>
<td>&gt;100</td>
<td>From 70 to 100</td>
<td>&lt; 70</td>
<td>From 70 to 100</td>
</tr>
<tr>
<td>Slope (topography) (%)</td>
<td>&gt; 30</td>
<td>From 10 to 30</td>
<td>&lt;10</td>
<td>5 - 20</td>
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<tr>
<td>Substratum</td>
<td>Sandy and rocky</td>
<td>mixed</td>
<td>muddy</td>
<td>Sandy, rocky, muddy</td>
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<tr>
<td>Trophic state</td>
<td>oligotrophic</td>
<td>mezotrophic</td>
<td>eutrophic</td>
<td>Eutrophic to mesotrophic</td>
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<tr>
<td>Fouling</td>
<td>low</td>
<td>moderate</td>
<td>high</td>
<td>Moderate to high</td>
</tr>
<tr>
<td>Predators</td>
<td>no</td>
<td>rare</td>
<td>abundant</td>
<td>some</td>
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</tbody>
</table>
Against arguments (2) - constraints

- the contamination of the environment (with food, feces, antibiotic leavings etc.);
- the genetic contamination of natural populations (through the inherent escape from the rearing installations of the biological material);
- relatively short vegetative period;
- the growth of the sophistication level of modern marine aquaculture.
**MARINE AQUACULTURE**

### Againts arguments (3) - constraints

**- Possible conflicts with other users**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Industry and harbors</th>
<th>Urbanisation</th>
<th>Tourism</th>
<th>Agriculture</th>
<th>Fishery</th>
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<tbody>
<tr>
<td>Spatial resources</td>
<td>The need for land</td>
<td>The use of land</td>
<td>The need for land Navigation/Bathing/Tourism</td>
<td>Coastal lands</td>
<td>Reproduction and growth habitats Artificial reefs Fishing areas</td>
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<td>Ship traffic</td>
<td>The need for land</td>
<td>Navigation/Bathing/Tourism</td>
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<td>Dredgings</td>
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<td>Environment quality</td>
<td>Contaminants</td>
<td>Waste water discharges</td>
<td>Anti-fouling substances</td>
<td>Fertilizers Pesticides Organic substance Suspended solids Fresh waters</td>
<td>Genetic escapes</td>
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<td>Ballast waters</td>
<td>Organic substance</td>
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<td>Waste water discharges</td>
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<td>Economy</td>
<td>Infrastructure</td>
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<td>Social Resources</td>
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<td>The need for space</td>
<td>-</td>
<td>-</td>
<td>Education Competences</td>
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<td>Navigation areas</td>
<td>Reglementations</td>
<td>The wild flora and fauna Protected areas</td>
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<td>Fishery reserves</td>
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<td></td>
<td>Harbors Military areas</td>
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</table>
THANK YOU FOR YOUR ATTENTION!