Spatial Planning For Marine Aquaculture
Croatia, Zadar County case

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Croatian Ministry of Agriculture
Directorate of Fisheries
## Production 2014

### Marine aquaculture

<table>
<thead>
<tr>
<th>Species</th>
<th>Quantity (t)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seabass (<em>Dicentartus labrax</em>)</td>
<td>3,214,721</td>
</tr>
<tr>
<td>Seabream (<em>Sparus aurata</em>)</td>
<td>3,654,575</td>
</tr>
<tr>
<td>Bluefin tuna (<em>Thunnus thynnus</em>)</td>
<td>2,223,759</td>
</tr>
<tr>
<td>Other species</td>
<td>120,888</td>
</tr>
<tr>
<td><strong>FINFISH TOTAL</strong></td>
<td><strong>9,213,943</strong></td>
</tr>
<tr>
<td>European flat oyster (<em>Ostrea edulis</em>)</td>
<td>32,164</td>
</tr>
<tr>
<td>Mediterranean mussel (<em>Mytilus galoprovintialis</em>)</td>
<td>713,841</td>
</tr>
<tr>
<td><strong>SHELLFISH TOTAL</strong></td>
<td><strong>746,005</strong></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>9,959,948</strong></td>
</tr>
</tbody>
</table>
Marine aquaculture - overview

- 340 locations (farms)
- 167 producers

<table>
<thead>
<tr>
<th></th>
<th>LOCATIONS</th>
<th>PRODUCERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>FINFISH</td>
<td>59</td>
<td>36</td>
</tr>
<tr>
<td>SHELLFISH</td>
<td>266</td>
<td>127</td>
</tr>
<tr>
<td>BLUEFIN TUNA</td>
<td>15</td>
<td>4</td>
</tr>
<tr>
<td>TOTAL</td>
<td>340</td>
<td>167</td>
</tr>
</tbody>
</table>
Legislative framework

- Physical Planning and Construction Law
- Environmental and Nature protection Law
- Maritime Law
- Marine Fisheries Law
Institutions involved

- Ministry of Agriculture
- Ministry of Environmental and Nature Protection
- Ministry of Construction and Physical Planning
- Ministry of Maritime Affairs, Transport and Infrastructure
- Counties
- Government
Physical plans

- 7 administrative regions on coastline - Counties
- County - Physical plans - have to define AZA
  - Necessary approval and consent of all ministries in the government
  - Public hearing
  - Bylaw defining basic AZA criteria
    - Site selection criteria: salinity, depth, seabed, currents ...
Location permit

- Location permit:
  - Mandatory for each farm within AZA
  - Concept design in line with physical plan
  - EIA (if requested)
**EIA**

- **EIA mandatory:**
  - Finfish farms located in a protected coastal area (within 300 m from the coast) with annual production over 100 tons
  - Fish farms located outside of a protected coastal area to a distance of 1 Nm with annual production over 700 tons
  - Fish farms outside the protected coastal area, which are distant from the coast of the island or the mainland for more than 1 Nm with annual production over than 3500 t
  - Mariculture zone in protected coastal area planned for more marine finfish farms
  - Shellfish farms in protected coastal area with annual production over 400 t
EIA

- Evaluation of the necessity of EIA:
  - Finfish farms in protected coastal area with annual production up to 100 t

- Content of the environmental study is prescribed by bylaw
- Study defines maximum production quantity regarding species, technology and site specifics
- Public hearing
EIA

- Study defines monitoring procedures
- Monitoring is obligated
- Monitoring includes sediment and water column
- There is no clear and defined set of indicators and monitoring parameters (not defined by law)!
Concession of maritime area

- Concession is based on location permit
  - County – areas < 300 m from coast
  - Government – natural protected areas and areas > 300 m from coast
- Maximum period up to 30 years
- Concession can not be extended except in special cases with agreement of government
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License for fish farming

- Contract of concession (Location permit, EIA)
- Decision of Ministry of Environmental and Natural Protection (EIA)

- Defines species, position, capacity (maximum annual production) and duration of license

- Duration of the license is related to the duration of the concession
Zadar county

- Aquaculture
- Tourism
- Fisheries
- Navigation
- Waste waters
- Ports
ICM - ZADAR COUNTY

- More than 50% of Croatian marine aquaculture
- Coastal zone the most important developing resource
- First symptoms of degradation due to the lack of integrated management
Solution – ICM?

- ICM gives information (scientifically based, relevant, easily accessible, transparent, etc) for decision makers regarding specific coastal area:
  - Suitability
  - Capacity
  - Possible conflicts
Solution – ICM?

Information includes:

- Resource – geographical description, physical, chemical, geological data
- Activity – characteristics, inter activities possible conflicts

In practice in Zadar County

Aquaculture Zonation based on ICM principles – Z₁, Z₂, Z₃, Z₄
ZADAR COUNTY

Each farm within AZA – mandatory monitoring within farm (EIA); financed by farm
AZA – monitoring of total area (financed by county)

AZA MONITORING - WATER COLUMN:

• General indicators: cloudiness, wind speed and direction, air temperature, sea temperature, waves, sea color, odor, transparency, floating wastes, solid wastes, visible fats and oils
ZADAR COUNTY

AZA MONITORING - WATER COLUMN:

- **Physical-chemical parameters**: salinity, density, suspended solids, dissolved oxygen, oxygen saturation, BOD$_5$, ammonia, nitrates, nitrites, total nitrogen, total phosphorus, total fat and mineral oils
- **Microbiological parameters**: aerobic mesophilic bacteria, intestinal enterococci, E. coli
- **Biological Indicators**: chlorophyll a
ZADAR COUNTY

AZA MONITORING - SEDIMENT:

- **Physical - chemical parameters:** total nitrogen, total phosphorus, organic phosphorus, total organic carbon, redox potential, granulometry
EXPERIENCE

- 10 years in practice
- Expensive, complex but optimal technical framework for AZA if applied properly
- Problems:
  - Lack of funds for AZA monitoring
  - Lack of defined parameters for other users of space (only defined for aquaculture)
- **Personal awareness is key factor!**
Thank you for your attention!