



HUSZPO

HRVATSKA UDRUGA STRUČNJAKA ZAŠTITE PRIRODE I OKOLIŠA

PRVA REGIONALNA KONFERENCIJA O PROCJENI UTJECAJA NA OKOLIŠ  
FIRST REGIONAL CONFERENCE ON ENVIRONMENTAL IMPACT ASSESSMENT  
Zadar, Croatia • rujan/september 18-21, 2013.

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Josip KRIŽAN, Lav BAVČEVIĆ

SPATIAL MULTI-CRITERIA ANALYSIS AS A FOUNDATION FOR SEA OF  
MARICULTURE DEVELOPMENT PLAN FOR SPLIT-DALMATIAN COUNTY

Ognjen Škunca, M.Sc. Env. Sci. • Granulum Salis Ltd., 3. Bijenički ogranak 13, 10 000 Zagreb, Croatia •  
(oskunca@yahoo.com)

Tomi Haramina, Ph.D. Physics • Oikon Ltd., Trg senjskih uskoka 1-2, 10 000 Zagreb

Fanica Kljaković Gašpić, M.Sc. Ecology; Sunčana Rapić, M.Sc. Landscape arch. • Geonatura Ltd., Trg senjskih  
uskoka 1-2, 10 000 Zagreb

Sanja Grgurić, M.Sc. Env. Sci. ; Josip Križan, M.Sc. Math. • Gekom Geophysical and ecological modelling Ltd.  
Trg senjskih uskoka 1-2, 10 000 Zagreb

Lav Bavčević, Ph.D. Biology • Croatian Agricultural Chamber, Regional Department of the Zadar County,  
Mažuranićeva 30/1, 23 000 Zadar, Croatia



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Motivation for the study / problem context

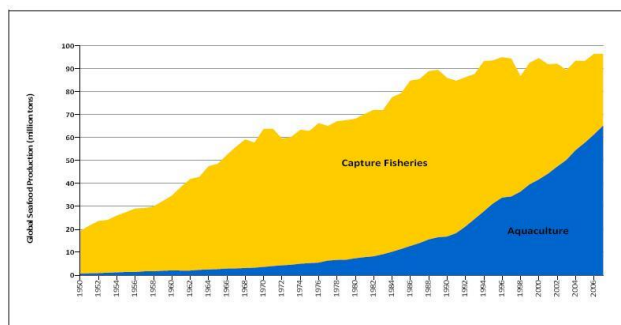
- Mariculture in the SD County perceived by vast majority (general public, media, local authorities ...) as a „dirty neighbor”, environment and nature polluter
- Mariculture development blocked by county physical plan that „solved the problem” by leaving to its municipalities to define areas for the activity that nobody wants in their backyard
- SD County's authority look „over the fence” in Zadar county, in which mariculture has established itself during the last decade as an important segment of the coastal economy, with practically no more objections from the public and other sectors
- SD County authority decided to follow the Zadar county approach back in 2003 – i.e. to prepare mariculture-related strategic document: *County Sea use and protection study, with focus on mariculture sectore, within the framework of Integrated Coastal Area Management*

## Objectives and content of the Study

- to present arguments proving that mariculture is important sector with its rights in coastal areas
- to explain how mariculture is development opportunity for SD – i.e. can be important segment of the SD County coastal area economy
- to identify sectoral trends (market, technology, competition, ...) relevant for planning of the sector development within the County
- to analyse SD County marine area, with objective to suggest areas that are most suitable for the tomorrow mariculture sectore, while taking into account environment and nature protection objectives as well as interests of the other sectors of the economy (tourism, fisheries, settlements, sea traffic).
  - Analysis required for the two main existing production types in marine environment: floating shellfish parks / farms; fish cage farms
- to present suggestions in clear format, suitable for policy making process (wide discussion and integration in revised County physical plan)

## Mariculture is important sector with its rights ...

Figure 1 – Total world capture fisheries and aquaculture production, 1950–2006



Source: FAO (2008), elaborated by APROMAR

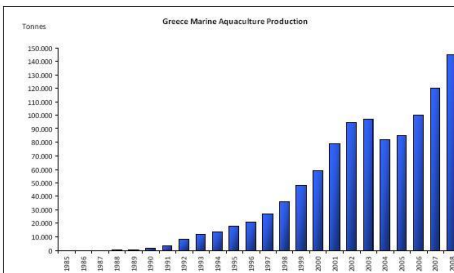
- Since 1950ies, with average annual growth of 7-9%, mariculture is the fastest growing sector of food production
- „farming replacing hunting...” this time in aquatic environment ...
- → Smart, green aquaculture: one of the three priorities in newly adopted *EU European Maritime and Fisheries Fund (EMFF)*: food production; green jobs in coastal rural areas; synergies with tourism ...

## A huge, still unused potential ...

- EU is the world largest seafood market
- 60% imported

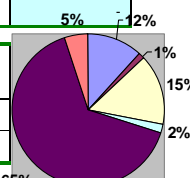
	Duljina obale [km]
GRČKA	13.676
TURSKA	7.200
ITALIJA	7.600
HRVATSKA	5.835
ŠPANJOLSKA	4.964
FRANCUSKA	3.427

Figure 6 – Greece: Marine aquaculture production, 1985–2008



Croatian mariculture production	1997	2005	2006	2007	2008	2009	2010	Strateški ciljevi iz 2002 (za 2010)
BIJELA RIBA	1.500	3.000	3.500	4.000	4.500	5.000	5.200	10.000
ŠKOLJKAŠI	790	3.000	3.500	3.500	3.000	2.000	2.000	20.000
TUNE	390	3.425	6.700	4.180	3.711	4.200	3.368	

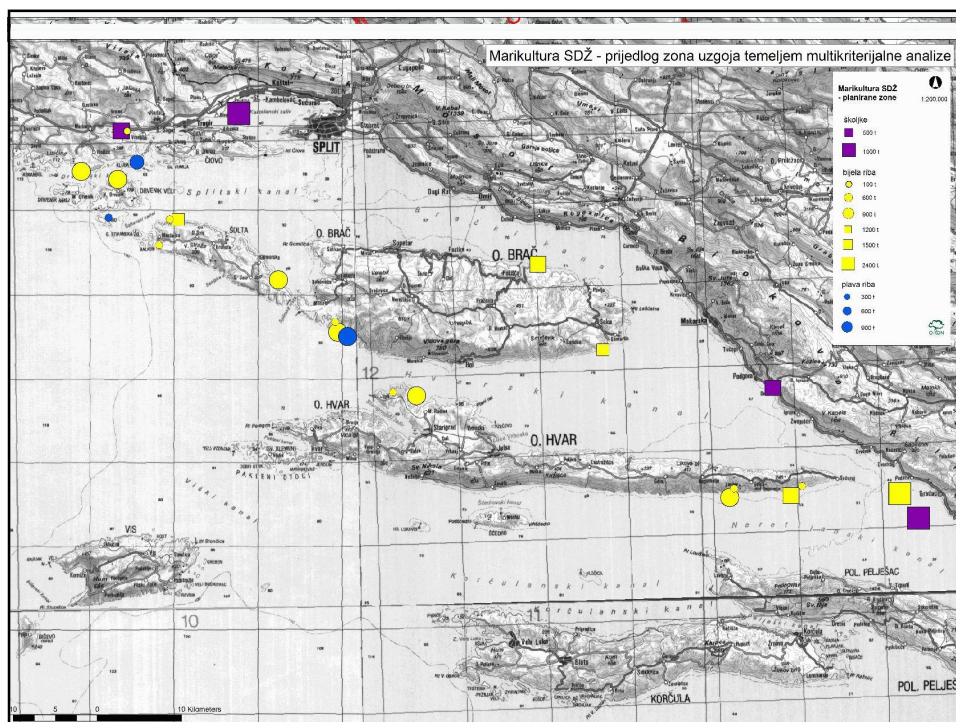
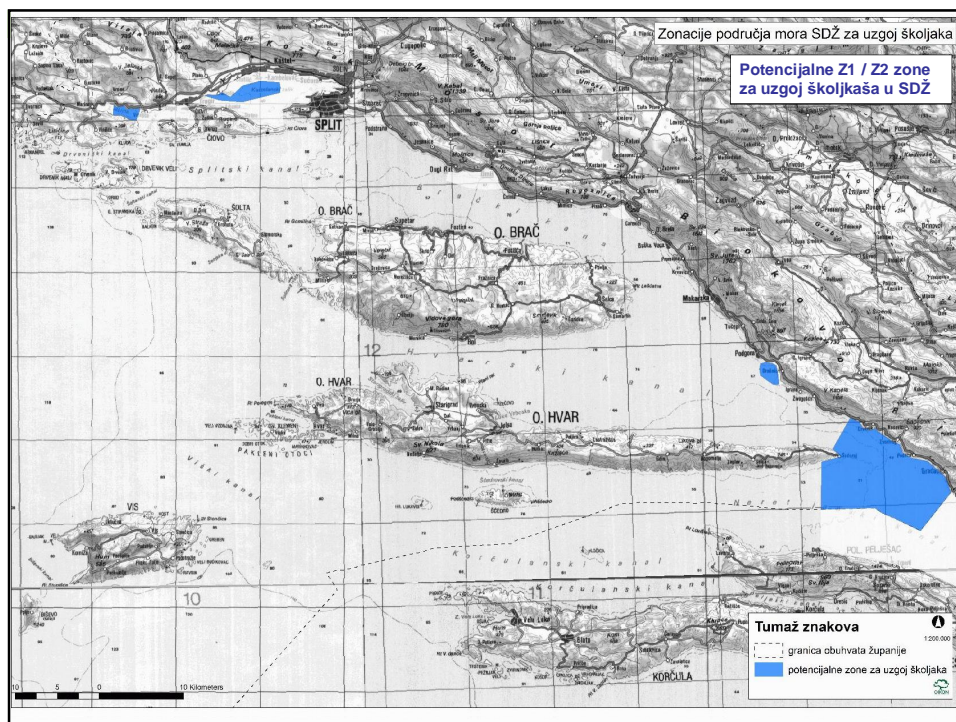
SD County mariculture production	2005	2006	2007	2008	2009	2010
BIJELA RIBA	500	500	450	550	550	600
TUNE	1949	3775	1574	2.000	1.500	1.865



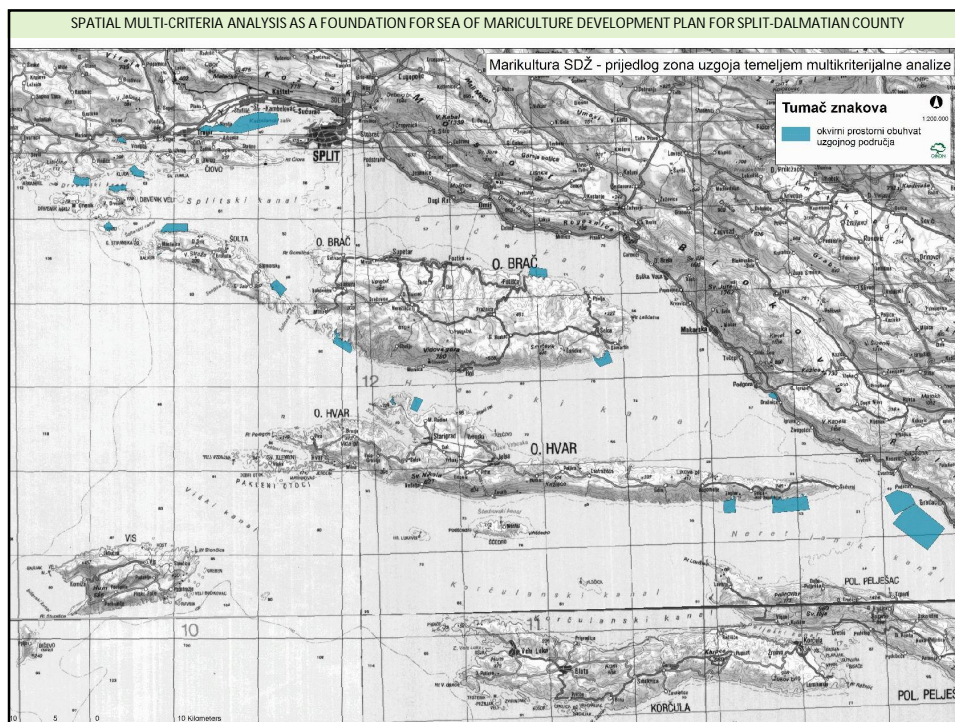
- Istarska
- Šibensko-kninska
- Splitsko-dalmatinska
- Dubrovačko-neretvanska
- Zadarska

## Controversies and Facts about mariculture environmental impact ...

- Current bad sentiments are reality based, however based on incidents with poorly managed and regulated practice ...
- ... while preserved environment is also in the best interest of the producers, as it is critical for efficient production (feeding efficiency, healthiness of organisms, ...) → development of greener technologies and farming practices!!!
- Impacts exist, but they are acceptable in the case of well positioned and managed production site (BASED ON MONITORING:
  - Even on the large fish cage farm, benthic habitat change no further than circa 150m in direction of the dominant stream;
  - eutrophication only in areas with poor sea exchange (also not good for production);
  - smell and grease couple of hindered meters down the dominant stream, however this can be mitigated by proper management;
  - landscape changes – resembles traditional fisheries scenery;
  - impact on wild populations – can be even positive, if taken care of the source of juveniles







## Discussion and conclusions ...

- The study contributed to a change in thinking about mariculture in SD County, as indicated by fact that majority of the suggestions have been adopted by decision makers in recently adopted new County physical plan
  - arguments and transparent reasoning provided by the study have proven (relatively) efficient in vast majority of discussions initiated during public review of the Draft physical plan
- The study provided required elements of the Strategic environmental assessment of the plan, i.e. report on how the plan has integrated environmental protection measures, as well as elements of Appropriate assessment for the plan - evenmore, ideal integration of the SEA and plan preparation processes
- The study adopted adaptive planning approach, based on integrated multi-tiered analysis and adaptive management based on monitoring
- The study conclusively has contributed to the quality of the proposed amendments to the County's spatial plan, as well as to the soundness and transparency of associated public review process



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