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Sustainable Extensive And Semi-Intensive Coastal Aquaculture In Southern Europe

Socio-economic assessment of national case-studies

International Workshop on Sustainable Extensive and Semi-intensive Coastal Aquaculture in Southern Europe

20-21 January 2010

Hotel Porta Nova, Tavira, Portugal

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Project Funded under the 6th Framework Research Project of the EU (FP6-2005-SSP5A)

The context

Improved extensive and SI aquaculture face a number of problems:

-difficulties to compete with Intensive products

-lack of support (Markets, Training, political support…)

-conflicts uses and competition for access to coastal area (coastal aquaculture in confined systems)

-…

This questions the place of coastal extensive and SI aquaculture in Europe

Hypothesis

Improved extensive and SI products are different from Intensive and other production systems products (cages mainly)

-Needs of research to quantitatively assess these differences

-Statement over existing production systems Surveys/Reviews

-Economic assessment of benefits induced by acknowledging these differences; technological innovation can sometimes lead to negative economic impacts on long run Technico-economic assessment

-Depending on their location and role, less intensive production systems can have additional outputs that are not valued on Markets (patrimonial value, cultural, aesthetic value, maintenance of ecosystems functions, etc.) Multifunctionality of aquaculture

Technico-economic assessment

How farms are impacted or can be impacted?

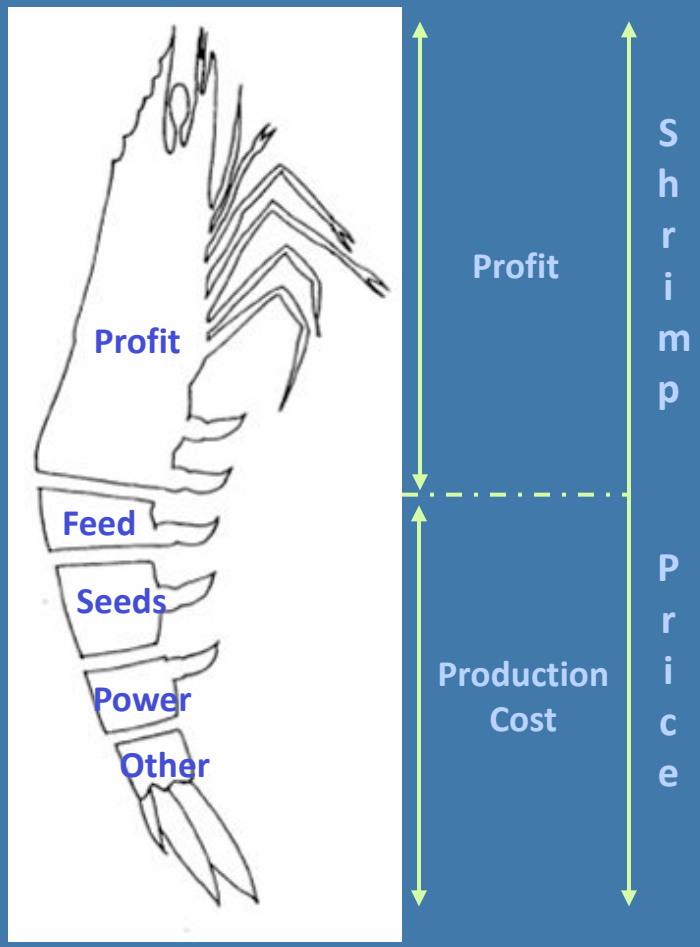
Illustrate the best performing practices from economic / social / environmental point of view

A survey dealing with those dimensions over several case studies:

-Polyculture in esteros (ext and ext+/S-I in Spain and Portugal)
-Integrated management of eels fisheries and oysters refinement in coastal lagoons and wetlands (France)
-Vallicultura (ext and ext+ aquaculture in lagoon along the Adriatic sea in Italy)
-Semi-extensive nurseries in lagoons (Ionic sea and Corfu island, Greece) and S-I in ponds

Cost and Revenue analysis: the approach

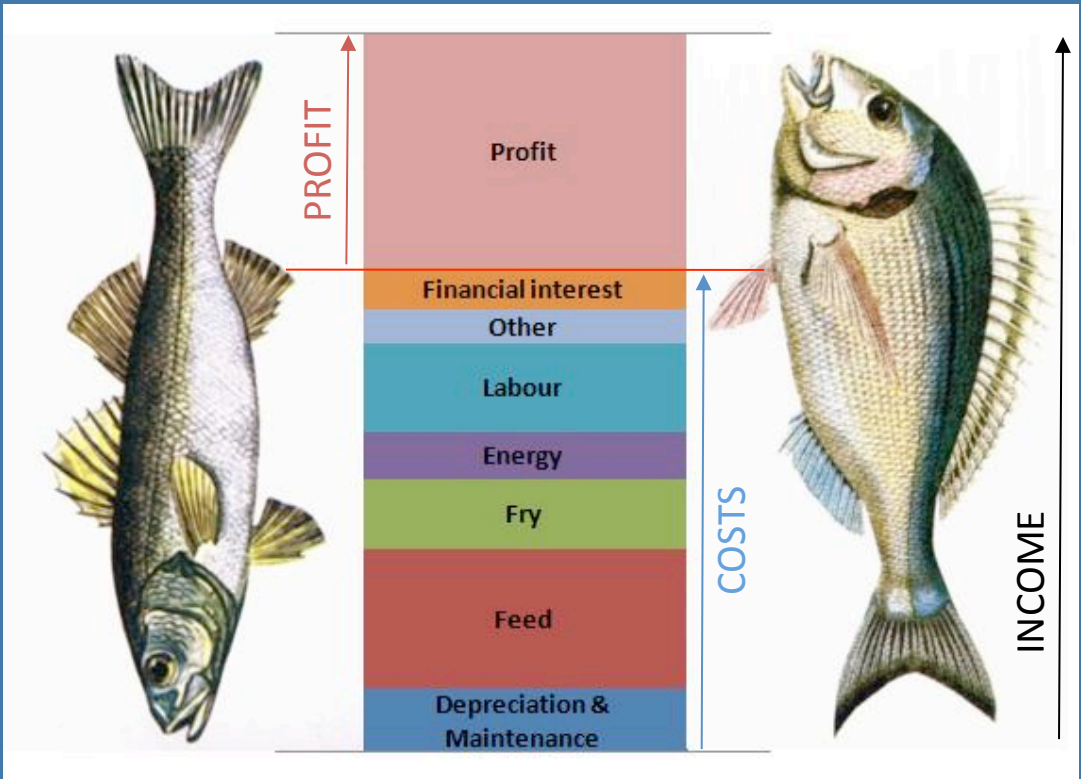
To produce 1 Kg of Shrimps:



Costs structure illustrates the way farmers combine inputs and provides a measure of the farms' economic efficiency. It can give indication to reach higher efficiency by reducing sunk costs.

Cost and Revenue analysis

Application to the esteros (Portugal, Spain) – harvest from 2007/2008:

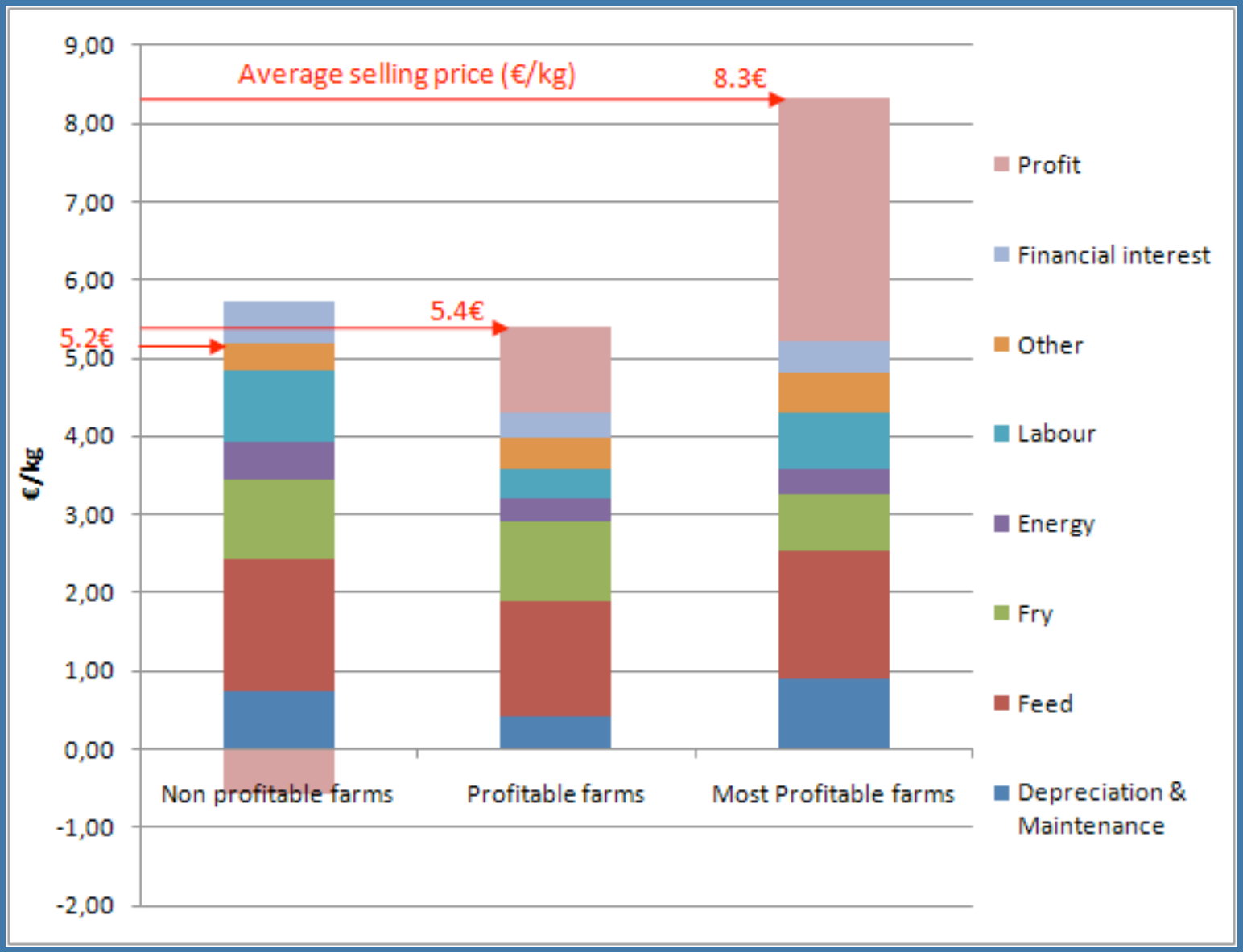


Production Cost (€/kg):	5.1
Average price (€/kg):	6.4
Lower price (€/kg):	4.2

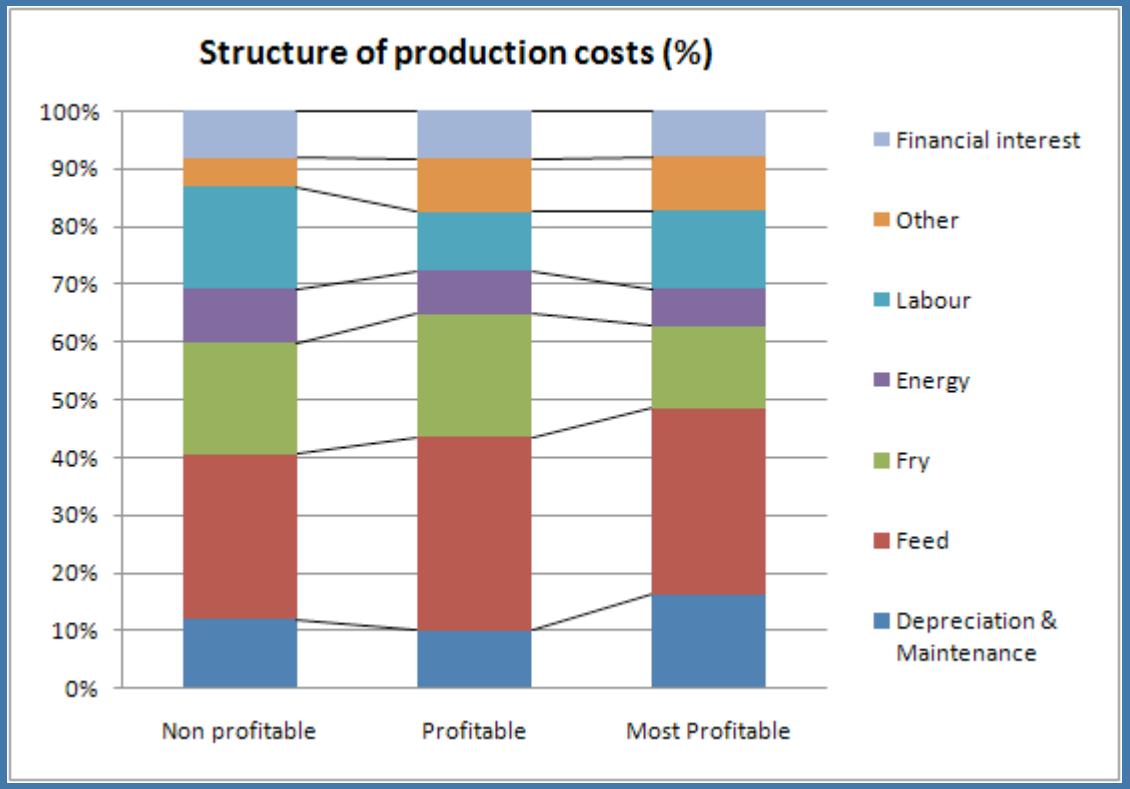
Cages:

- Production about 20 kg/m².
- Average production cost observed: about 3 €/kg (about 3.6 €/Kg in the best case for the esteros).
- Shorter cycle: 14-16 months (seabream) and 16-18 months (seabass) for a 300-400g fish; less than one year for pre-ongrown fish (40-60g) to reach 300g.

Production Costs & Strategies



Production Costs & Strategies



Costs structure doesn't underline strong differences except for infrastructure, labour and fry. Systems are in a rather close technological process, more or less intensive.
Differences are more underlined in terms of volume and answer to 3 different strategies.

Production Costs & Strategies: comparison of results

Farms (surveyed in end of 2008)	Non Profitable	Profitable	Most profitable
Pond area (ha)	7.2	7,9	6,5
FCR	2.10	2.05	2
Mortality (announced)	18.3%	15.0%	15.0%
Production (t)	56	53	58
Average Size at harvest (g)	400	385	643
Production Cost (€/kg)	5.7	4.3	5.2
Average Price (€/kg)	5.2	5.4	8.3
Profit Rate (%)	-11%	20%	37%
Break Event Point (BEP) (kg)	63	43	43
Production/BEP	90%	125%	133%
Employment (t/person)	15	13	26

Mainly S-I implementing a 2 years long cycle and pushing the system over its limits through intensification to balance prices decrease. Trapped in an inefficient economic efficiency.
Production Cost: 5.7 €/kg
Average price: 5.2 €/kg

Usual semi-extensive/SI and some extensive. 2 years long cycle. Profit just pays for investments and partners.
Production Cost: 5.1 €/kg
Average price: 5.4 €/kg

S-I farms targeting bigger product size through partial harvest (year2) and longer cycle (3 years long).
Production Cost: 5.2 €/kg
Average price: 8.3 €/kg

3 different strategies

Extensive systems

Fish aquaculture in esteros (Spain and Portugal):

Often part of cultural inheritance, extensive systems are more the result of a status quo. Extensive aquaculture is traditionally more related to subsistence aquaculture but in Spain almost 90% of the 8000 available ha for extensive are abandoned (Yufera 2008).

Extensive in esteros:

Origin of Fry	Wild (+ hatcheries for extensive +)
Stocking Density PL/m^2 Charge Kg/m^2	Unknown Unknown
Average grade at harvest and cycle duration	> 400 g 1 year
Yield	200 to 400 kg/ha/year until 1 kg/m^2 (theoretically)

Production costs are difficulty assessed through practices tending to switch to a more and more recreational activity for surviving systems.

Systems usually enjoys better prices due too higher grade but limited production makes difficult to reach advantageous marketing channel. Low yield is requiring huge areas (on the model of Greek nurseries in lagoon) to ensure sufficient income or interest for family based farms and face disinterest in this system.

Yields also decrease, probably due to environmental degradations and difficulties in maintaining systems functionalities.

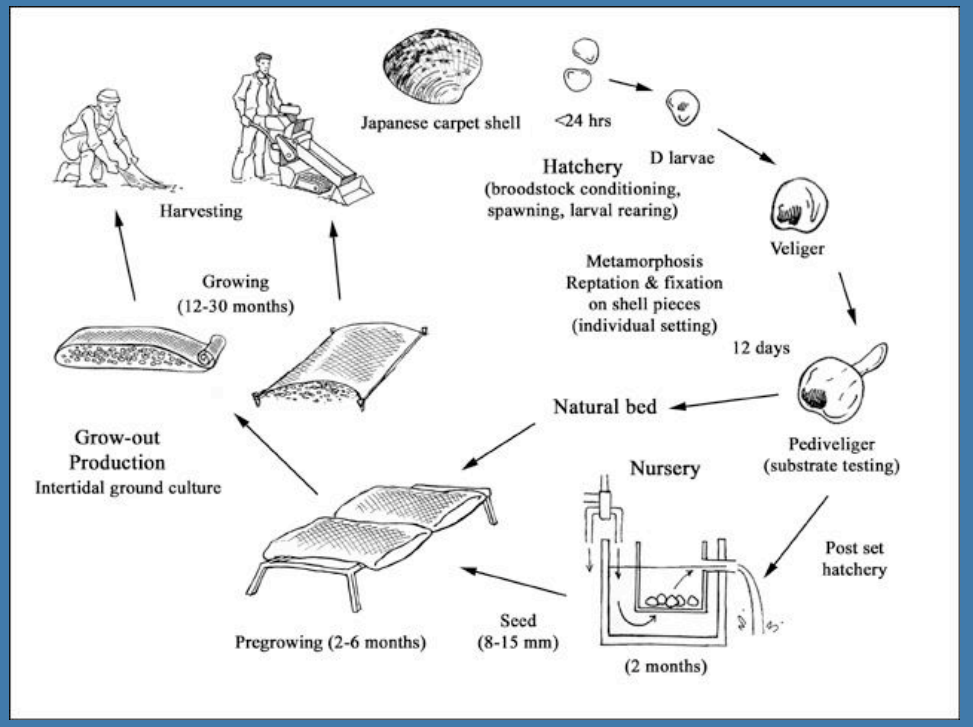
Extensive systems

The case of clams and oysters farming (Algarve, Aveiro (fishing), Andalusia)

Seeding (2 to 3 g seeds): 500 g/m²

Final production (2 years):
Good result: 1.5 kg/m²
Bad result: under 500 g/m²

Issue is less a market issue (for shellfish) rather than environmental constraints through lower and lower productivity and important mortality occurrences. Prices are still high when benefiting from good environmental conditions (no purification) and then avoiding several segment of middlemen (until 10 to 12 €/kg); (4 to 5 €/kg to middlemen depending on grade).



Production cycle of *Ruditapes philippinarum* (FAO)

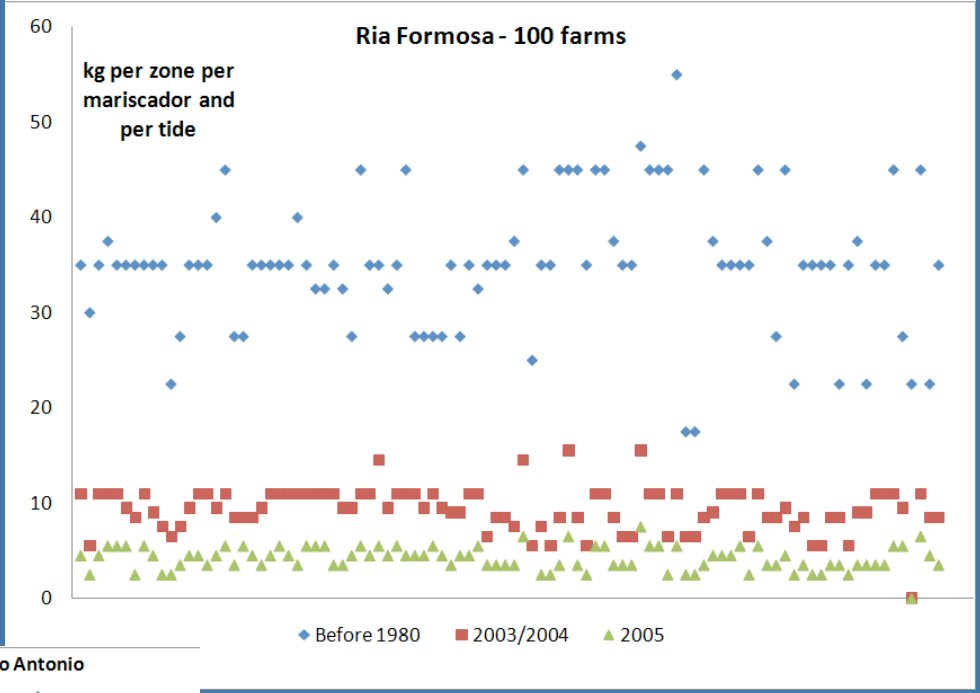
Trend to overstock to balance lower productivity; optimization model (Ferreira 2007) underlines a charge of 90 ind./m² for profit maximisation (under eutrophication conditions).

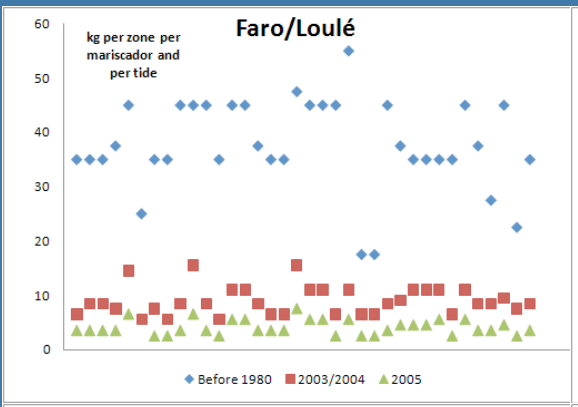
Pressures from other economic activities and environmental regulations.

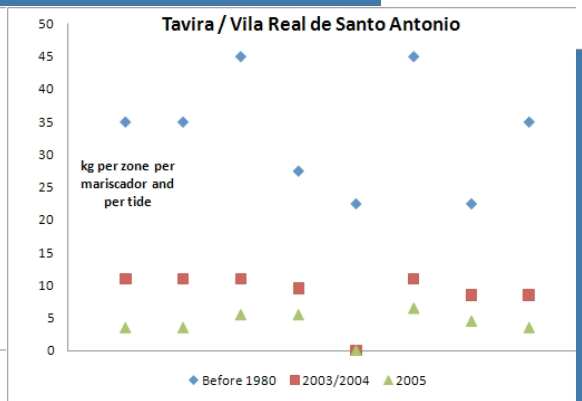
Catches/harvest of *Ruditapes decussatus* in kg per zone, per meriscador and per tide in Ria Formosa

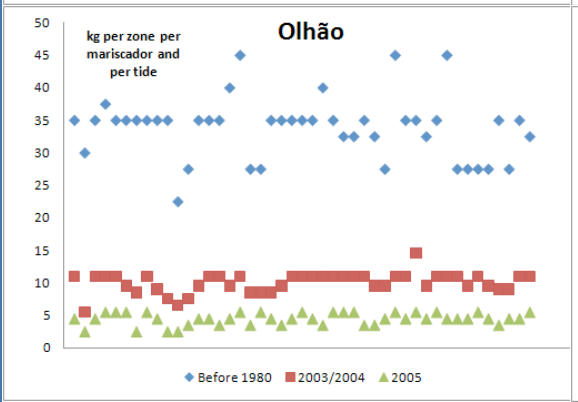
(Data from APAA - 100 farms)

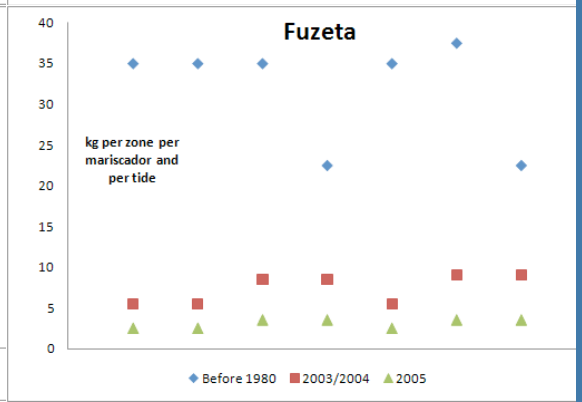
Before 1980	2003/2004	2005
35,1 kg	9,4 kg	4,2 kg
Average per zone/tide/meriscador		











Ex. of Andalusia (Spain):

Charge: 500 ind./m²
Yield: 4.25 t/ha/year
Average price: 6 €/kg
(Japanese clams)

Extensive systems

Integrated eel fisheries (fossé à poissons) and oyster farming (claires)

Eels: Fossés à poissons ("fish ditches") over the Seudre river wetlands and estuary (France)

Difficult to assess the activity due to the scarcity of actors. When still existing it is often implemented with another activity (agriculture traditionally) or in a recreational way (no more subsistence). A trend to decline and abandon: habitats degradation, pressure of human activity over wetlands (urbanization), predators...

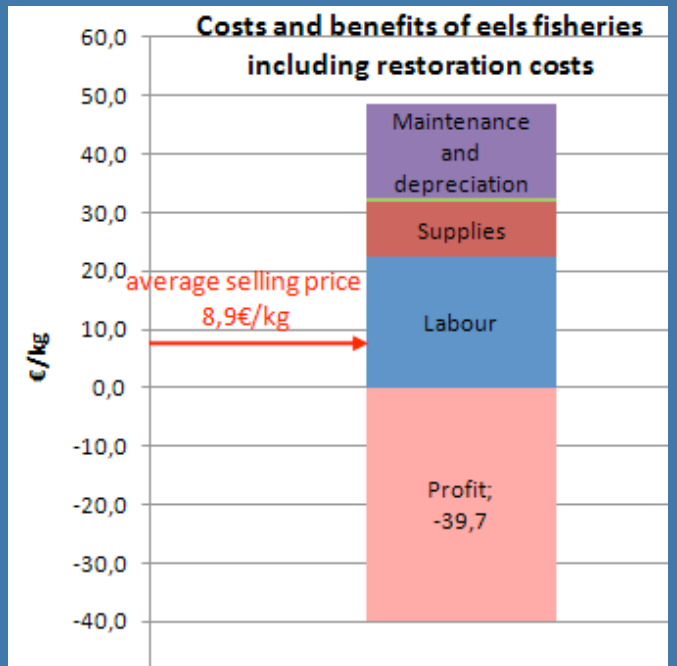
Example of present production:

3 kg/oeillet (internal pond) vs. 50 kg previously

1.2 tons for 10 ha of water (eels, seabass, seabream, mulets, soles, shrimps) when 50 ha would be needed to ensure a sufficient income and profit.

The issue is then rather perceived in terms of restoration and project analysis (economic feasibility) through changes in practices and techniques following an initial restoration by machines. Purpose is to initiate a new dynamics. CREAA (2001 – CTE).

But considering solely the private costs and benefits and if it doesn't benefit from other activities' facilities, it illustrates the difficulty of a pure aquaculture activity compromised by restoration and maintenance costs.



Extensive systems

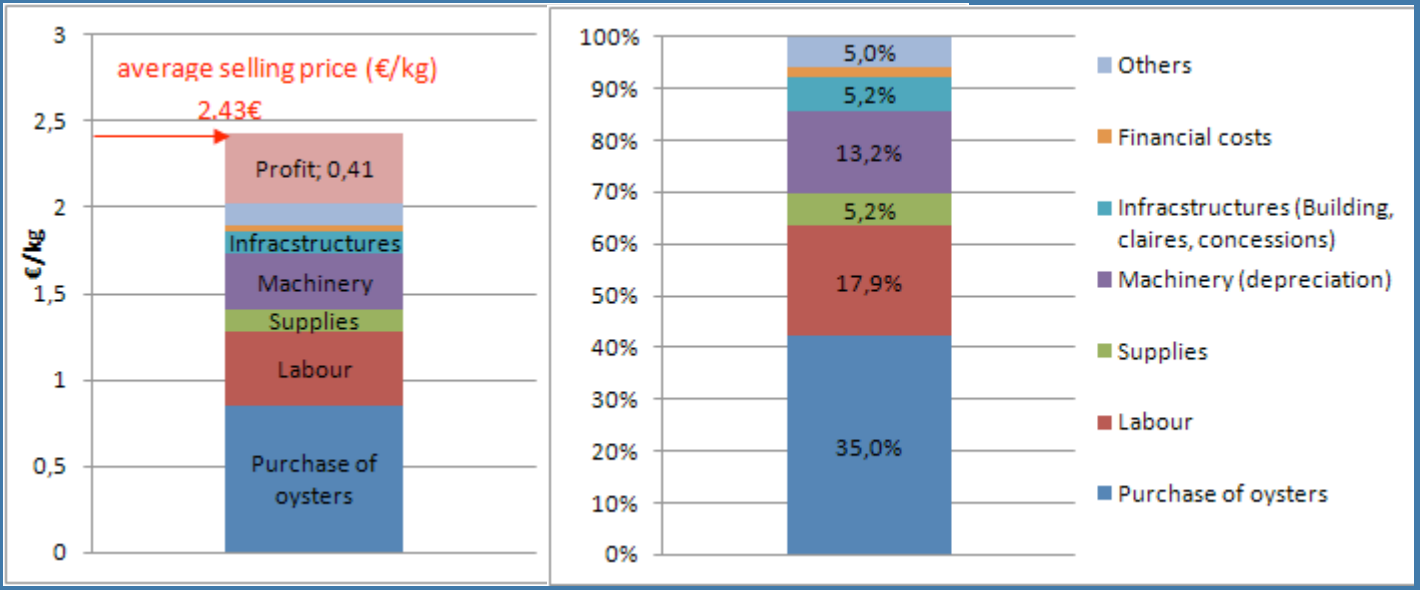
Integrated eel fisheries (fossé à poissons) and oyster farming (claires)

Oysters refinement in “claires” (refinement ponds) over the Seudre river wetlands (France)

A case study “polluted” by high mortality (2008 and 2009) and difficult to extract the share of claires from a profitability point within the economic performance of farms.

From accounting analysis, a typology in six farms with a worry for the farms segment below 50 tons production. Other quite good profitability but sensitive to crisis (before mortality occurred).

Average profitability and production costs of the oyster farms over the oyster basin studied for sales in bulk dominant activity (2009)



Extensive and improved extensive systems: Valliculture

Not yet robust analysis but from first seems close to semi-extensive systems in esteros in terms of economic efficiency

Extensive and improved extensive systems: Nurseries in lagoon (Greece)

Enjoy very specific environmental conditions and large areas that makes the systems non reproducible in other places. Profiting from this “rent of situation” they present good economic performances.

Conclusion - Evolution

-A sector that faces important difficulties that compromise the future of the industry in confined areas for intermediate intensification scales as illustrated by coastal seabream and seabass aquaculture segment (just profitable to non profitable).

-In that context a trend to concentration for more intensive systems and withdrawal for more extensive family based systems with medium terms irreversibility.

-It questions the development of coastal aquaculture in Southern Europe, roots of this development and reasons for supporting this industry.

-Other dimensions for an industry that deals with natural resources and especially common natural resources?