1st WEBINAR
Towards Sustainable Aquaculture in the Mediterranean
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CASE STUDIES - Innovative solutions for addressing aquaculture challenges and conditions for promoting their capitalization.

"Economic Challenges"

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Mediterranean Aquaculture Integrated Development

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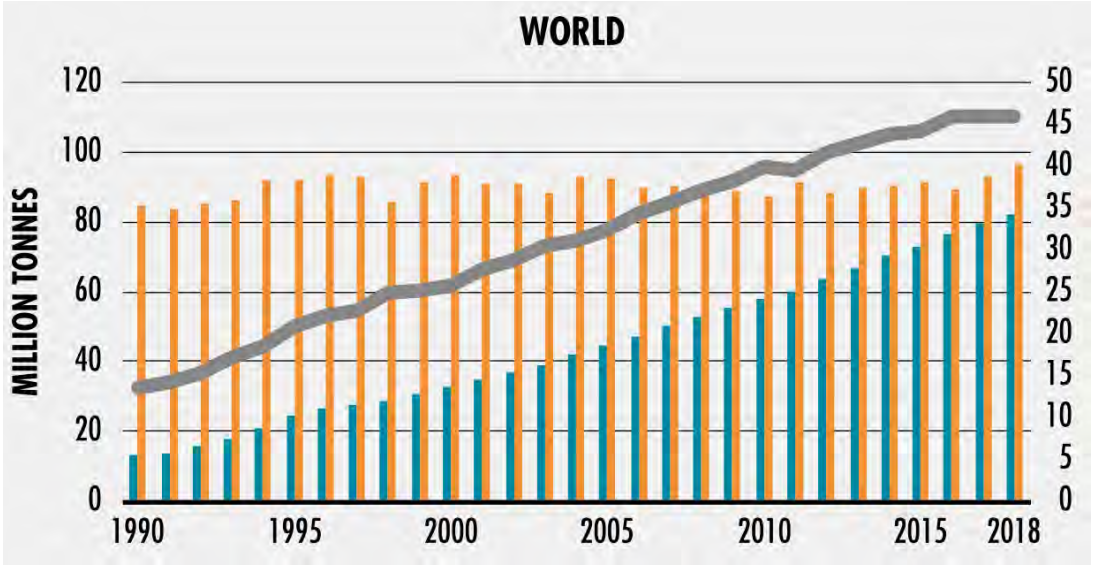
Marine Aquaculture Development: Challenges? Mediterranean specificity?

To identify challenges to sustainable Mediterranean aquaculture development and we first need to review and identify issues and potential bottleneck of AD (knowing where you come from to know where you are going).

1. The Blue Revolution

It is the rapid expansion of intensive commercial aquaculture. It aims at increasing global food production and reduce world hunger. In the 80s it is then the development of the so-called "new aquaculture" (marine) with the production of species like Salmon, Shrimps (penaeid), Seabass and Seabream as the main species.



Contribution of aquaculture in total production of aquatic animals (FAO SOFIA 2020)

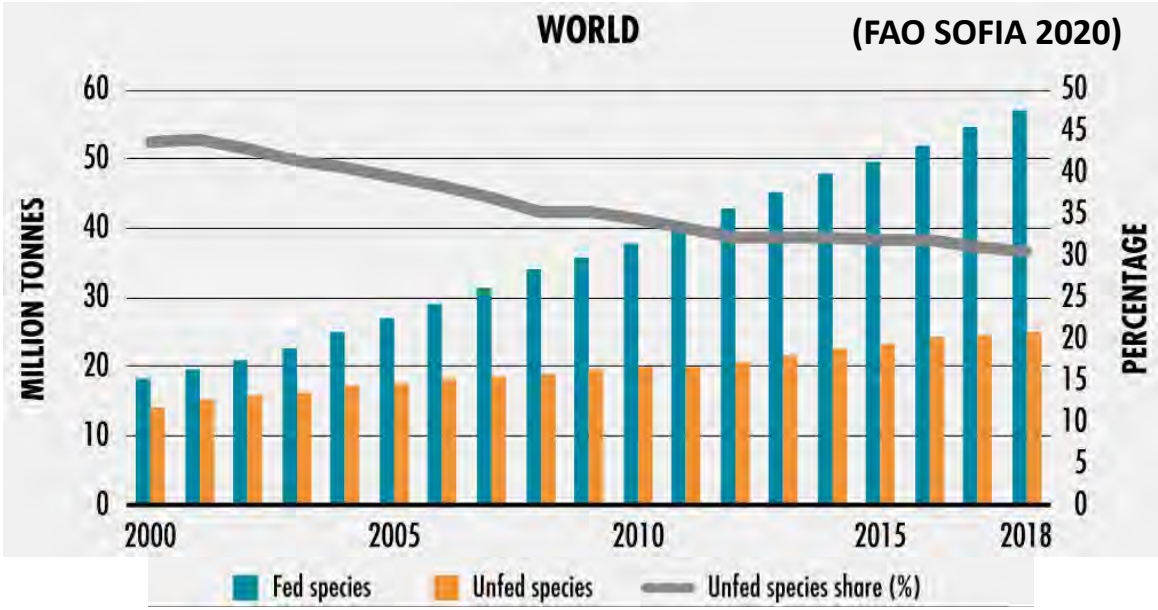
Over the last three decades (1980-2010), world production of farmed fish for human consumption has increased almost 12-fold, with an average annual growth rate of 8.8%. Despite decreasing growth, aquaculture has been the engine of growth in total fish production since the 90s. In 2014 and for the first time, the supply of fish for human consumption from aquaculture was higher than that from catches.

1. Blue Revolution

But its implementation has raised many concerns: production becoming energy-intensive, nutrient pollution, vector of invasive species, habitat destruction, ecosystem destructuration, spread of diseases… and an aquaculture becoming a consumer of resources via fishmeal and fish oil instead of being a net producer of animal proteins (Pullin et al. 1993; Folke et al. 1998; Goldberg and Triplett 1997…).

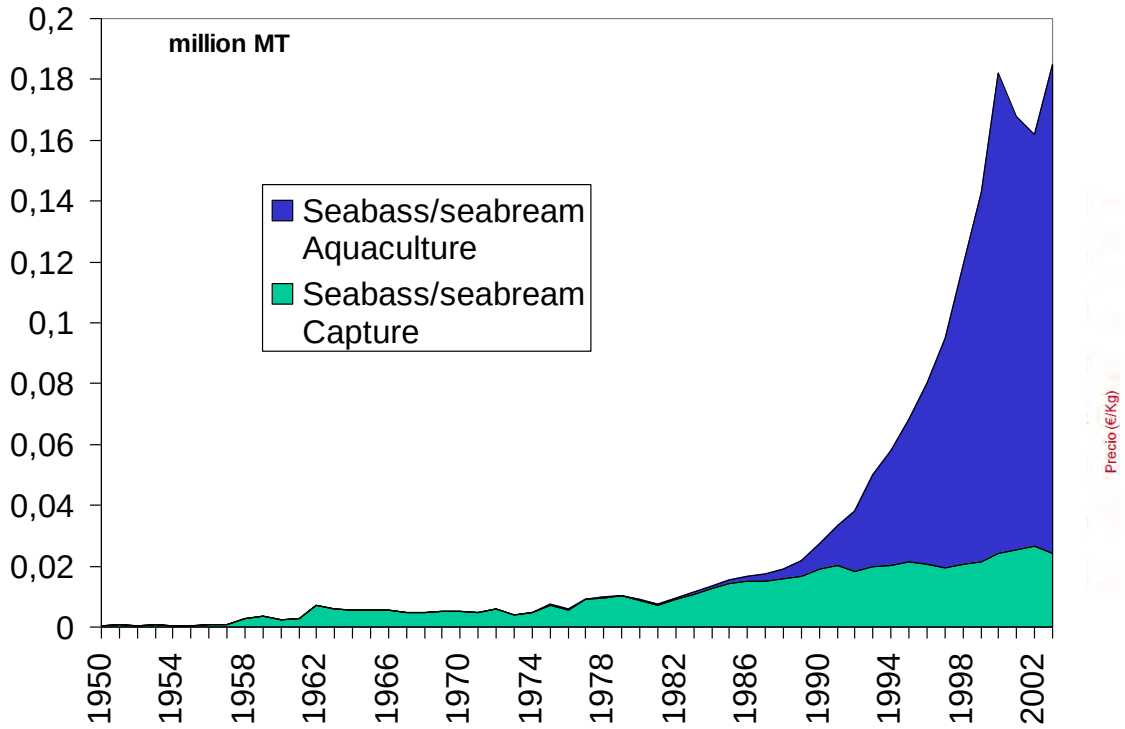
To maintain its production and continue to grow, aquaculture must overcome a number of growing constraints.

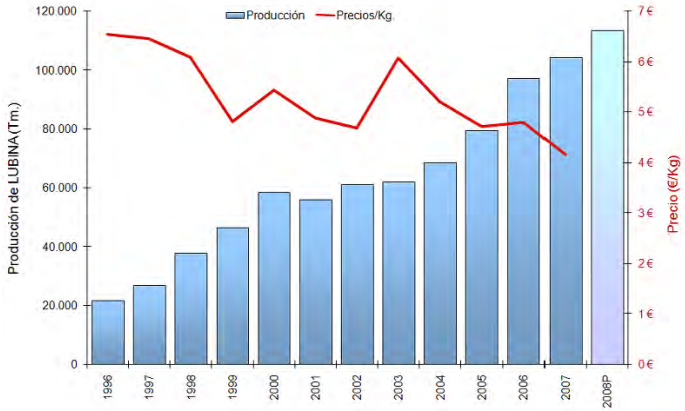
Nutrition (feed) is perceived as the most limiting factor to growth (fish oils and fish meals). Today almost half of the aquaculture production is carried out without nutrition (mainly algae and shellfish), but almost 70% of the farmed fish are artificially fed.

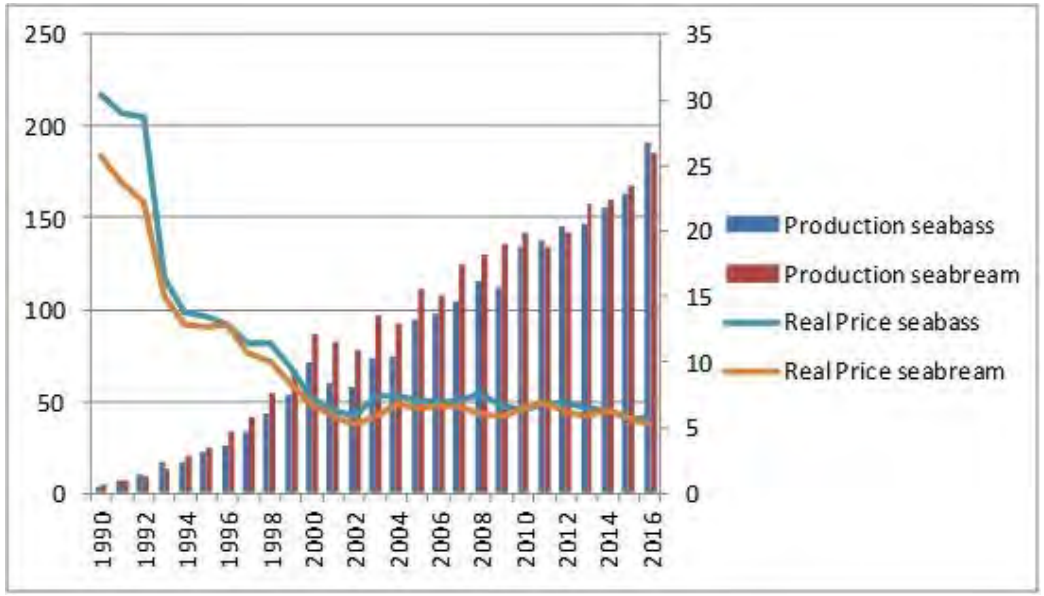


Rather technological and engineering responses, the DNA of aquaculture (species, genetics, disease, domestication, nutrition, CoC, BMPs, simplification of administrative procedures…). But little or no institutional and organisational innovation and a development **too often disconnected from the characteristics of demand and preferences**.

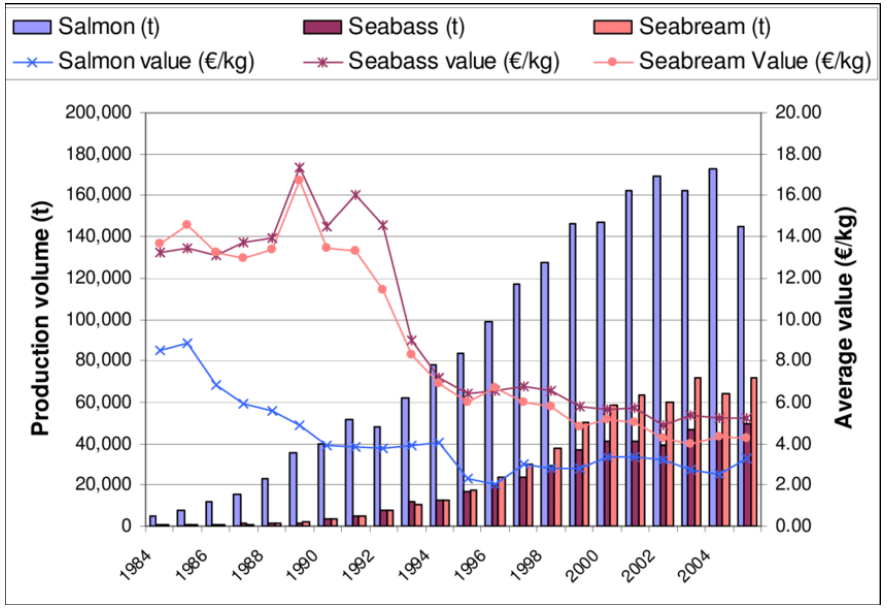
Technical answers that could also lead to adverse effects or social and economic biases.







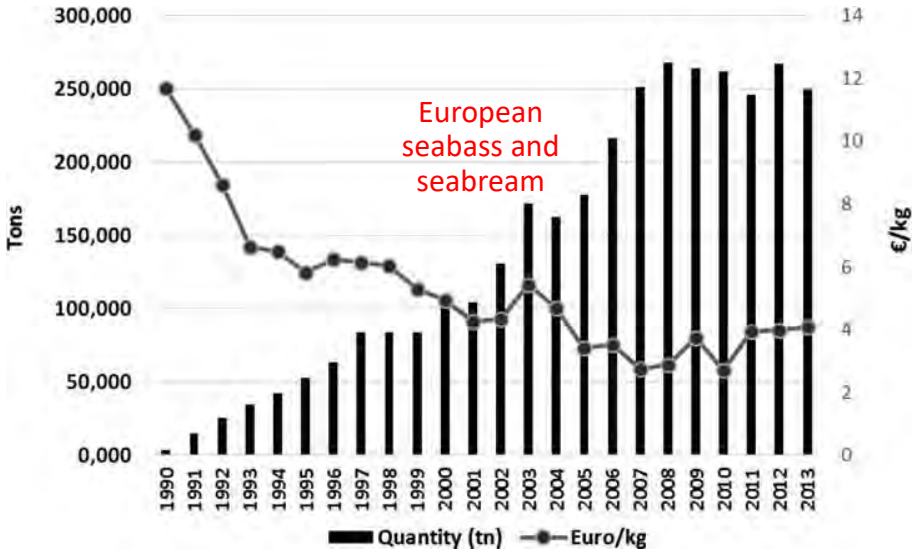
European seabass and gilthead seabream (Lozano D., 2019; MedAID project)

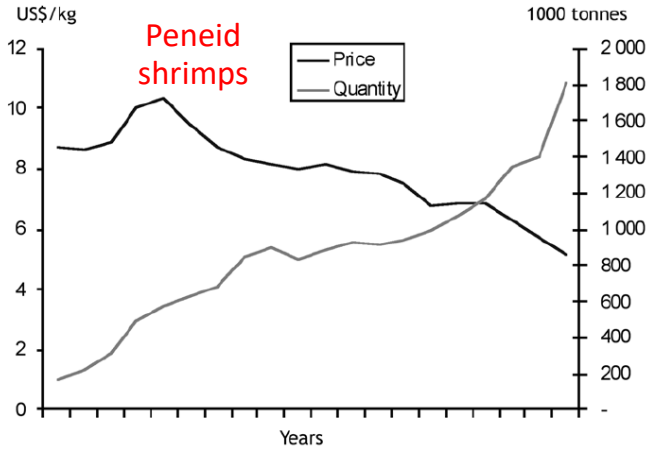


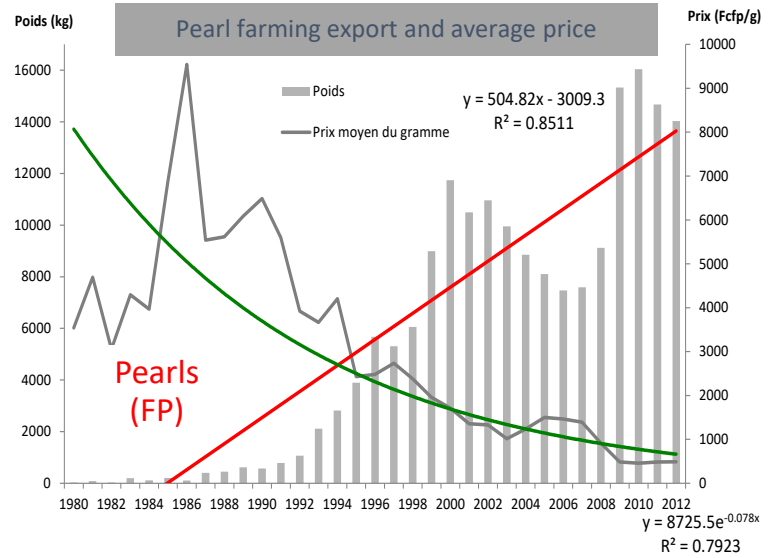
(Bostock J. et al, 2008)

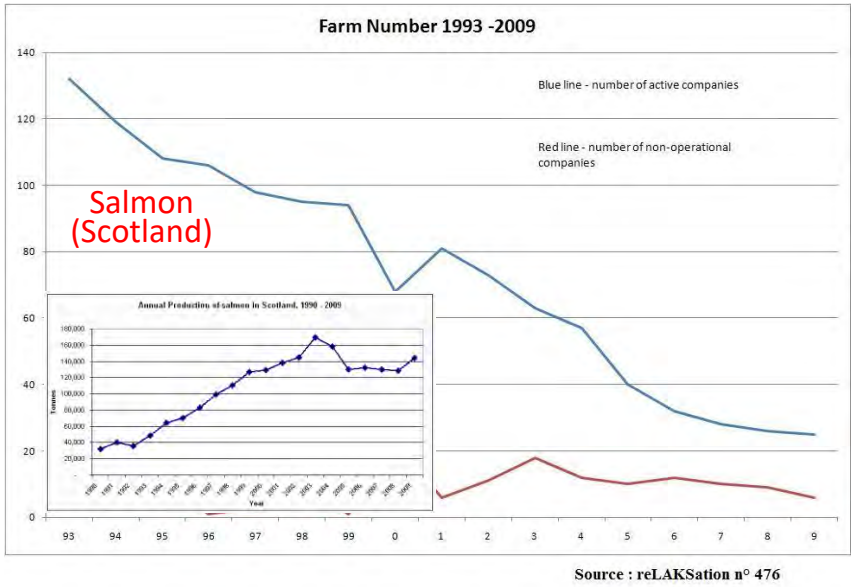
Farm gate prices impacted by the dramatic increase of supply.

A classic price mechanism part of the Demand and Supply market mechanism…









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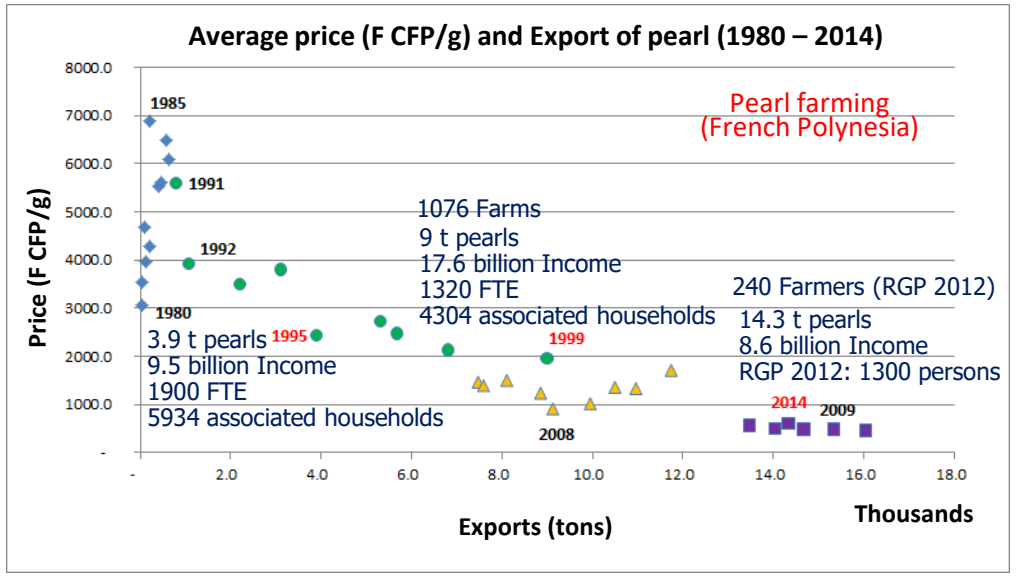
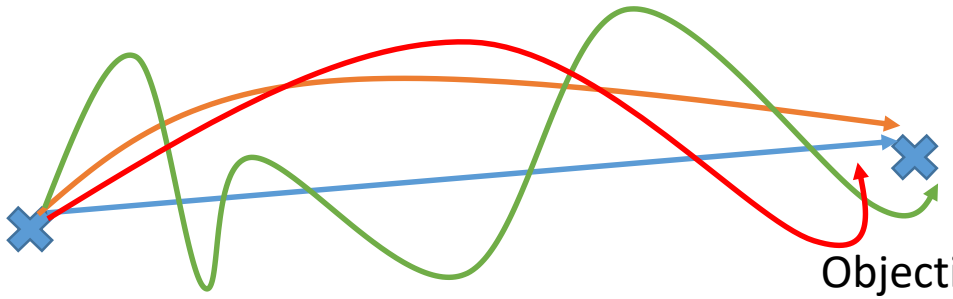


Lower economic efficiency in the use of resources, and fewer induced effects (jobs), but greater technical efficiency to maintain and increase production volumes. Collective result at the industry level of the sum of individual and rationale choices at farm level.

A development too disconnected from the markets AND, more importantly, from market evolutions.



Initial development period

Objectives set at initial development

Mostly expressed in terms of:
- volume (tons)
- and/or value (€/$)

What is important are not the initial conditions and the final ones of the development model, but rather the ways or trajectories to achieve them.

Objectives set in terms of volumes, but how is the transition being made?

- Technology, while obviously necessary and the basis for aquaculture, is not sufficient to ensure the sustainability.
- From technical and environmental ones, the main bottlenecks to development moved to socio-economic ones.
- The question of the transition between the present situation and the objectives set: path to sustainability, transition shocks, vulnerability and adaptation of farms, relevance of the objectives and means of achieving them.

As a consequence, today the industry is instead trapped in a single cost reduction strategy, when other potential strategies (e.g. better segmentation) are pushed at the back of the stage.

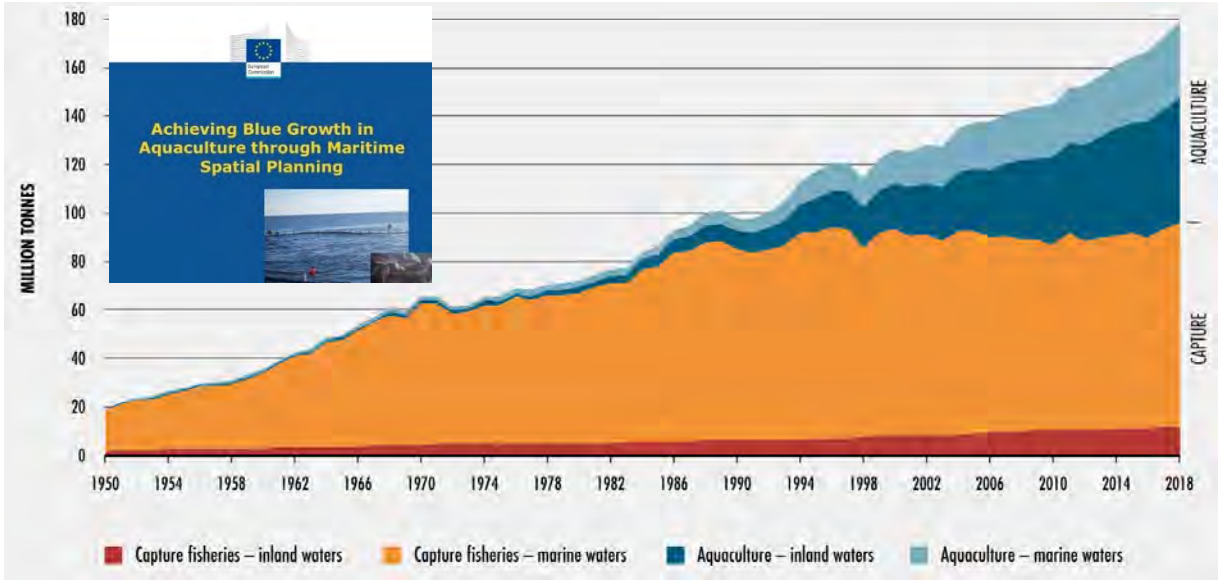
Produce for whom? Produce for what?

2. Blue Growth (2012) and Aquaculture

There are new drivers to aquaculture development:

- Fastest-growing food production sector
- Increasing demand for seafood products (population growth, urbanization, rising living standards, international trade offering greater choices...)
- Stagnating catches from the 90s' (about 90 million t.)

Aquaculture is therefore required to meet these needs by increasing its production by 50% from 2008 to 2022 and doubling it by 2030 (IFPRI's IMPACT model).



World Fisheries and Aquaculture Production 1950 – 2018 (FAO 2020)

European aquaculture, a pillar of Blue Growth.

A quantitative and spatial expansion vision to be implemented through:

- Integrated Maritime Policy
- Strategic guidelines for the sustainable development of aquaculture in the EU
- National and Regional Strategic Aquaculture Plans
- MSP Maritime Spatial Planning

In Europe and in the Mediterranean : a trend to move to offshore to break free from environmental constraints and conflicts of use: IMTA, Multi-uses Offshore Platforms.

Still a rather technical and technological response to aquaculture sustainability through an approach in terms of environmental sustainability. Issues from the Blue Revolution are still not yet addressed through the BG strategy.

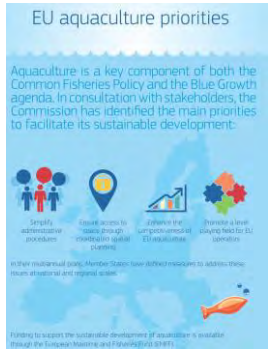
Aquaculture development within the BG and MSP remains thought out and translated according to:

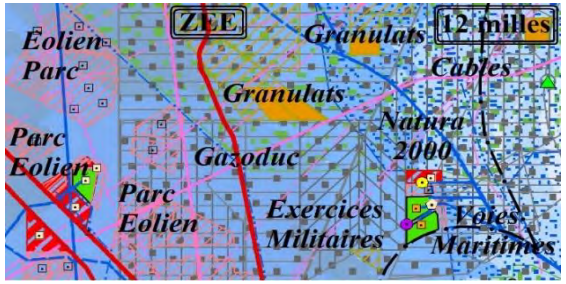
- sites selection (Where?)
- carrying capacity (How much?)
- ecological intensification (How far?)

→

- **Allocated Zones to Aquaculture (AZA)**
- **Regional development schemes for aquaculture**
- **…**

Integration displayed, but rather absent in practice (segmentation, exclusion more than integration). A MSP closer to a 80s' zoning 2.0 ?





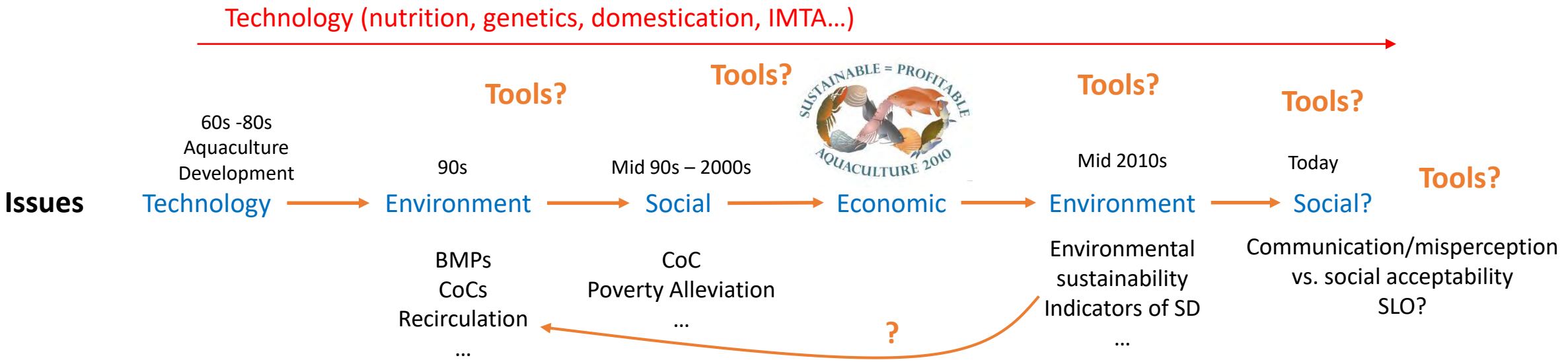
In practice:

- While there are new drivers to aquaculture development, the main bottlenecks remain unchanged. However, these appear to be less technological or environmental (or not only) but rather social and economic.
- Aquaculture development in support to or through Blue Growth remains sold on the same basis, although knowledge about its development dynamics has progressed a lot. It is still disconnected (or insufficiently connected) from demand and its characteristics, from the evolution of demand, from the development of territories...
- Aquaculture development is thus rather thought through available technologies and high value of species related to initial prices of the introduction period.

Innovations…

Raising the question of the type of aquaculture development is also asking the question of **which aquaculture and for whom? In what context and what territorial framework before asking the question Where? How much? How ?**

If integration is declared and stated (Marine Spatial Planning), it is rather missing in practice (segmentation, exclusion rather than integration). Faced with the difficulty of implementing integration, tools come before questions and concepts follow concepts.



Needs for a more integrated approach and holistic view of aquaculture development. This integration argues rather for a systemic approach of aquaculture development. A (real) **System Approach Framework (SAF)** to Aquaculture.

Not new! (EEA, EBAM, ICZM…) but going beyond of deviated concepts by misused tools. The new knowledge is the integration of existing knowledge. This is an old and long inaudible statement, but today it becomes more audible.

Needs to get out from the dichotomous approach of pro vs. anti aquaculture, of intensive vs. extensive… A new way to think aquaculture development and better formulate the issues of development.

Innovations…

- Moving from the CC pillar approach to plan aquaculture calls for a more integrated approach of CC through the development of an Integrated Carrying Capacity approach combining the ecological, CC, the economic CC and the social CC that will b at the core of the SAF for aquaculture.
- Capacity transfer is also not only matter of technology and zootechnics skill. It has also to include capacity to plan and manage aquaculture projects **within and integrated in a territory and connected to markets and their evolution**.

More Mediterranean centred and related to Northern Africa there is a number of additional innovations that could rather take place at local level, once the macro level issues addressed. Among them:

- When consumption and production increase, usually the diversity of farmed species and products decreases. This concentration is a source of vulnerability for the industry. There's no one aquaculture but there are aquacultures. Products should reflect this diversity to reach a higher segmentation of products and being less sensitive to crisis.
- The choice of smaller species and lower value species could also enhance the (higher number of crops; closer to local markets and consumers preferences, less dependant to exports and international markets).
- …

Conditions needed for replication

No real specificity attached to Mediterranean, the same dynamics acting all over aquaculture systems and products, The issue is then not to duplicate tools or technical solutions but a process. Leaving the misunderstanding between tools/solutions and processes. Tools do not formulate an issue, but come into support to the implementation of a process (no genericity). Not an issue of replication of production system, model and so on.

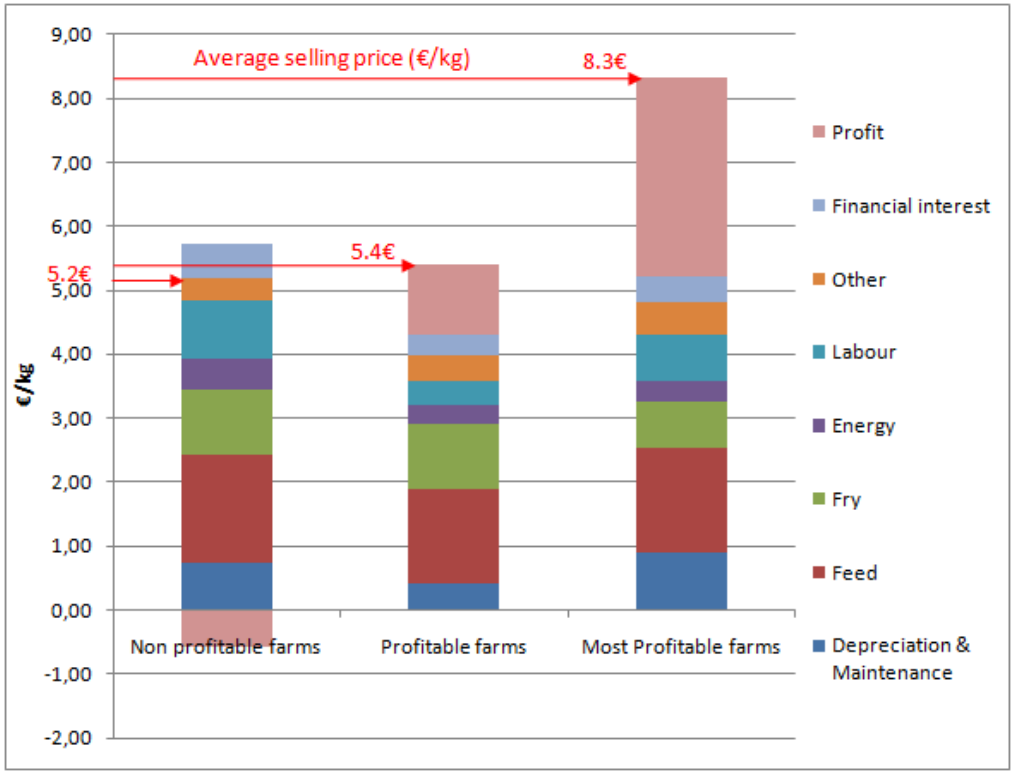
Conditions needed for replication

There are few illustrations of the implementation of a System Approach Framework to Aquaculture (SPICOSA and BALTCoast for instance). But other holistic approaches follow the same logic (agent based).

One common point is to switch from top-down to a bottom-up approach and capitalizing on successful experiences that could form a critical mass for aquaculture development. Stakeholders engagement and participative approaches are key to ensure an efficient and legitimized implementation of the process, allowing for a definition and co-construction of aquaculture development.

Beyond the co-construction of sustainable aquaculture projects rooted in their socio-ecosystems, SAF to aquaculture has also a role in exploring the evolution and functioning of the aquaculture system and provide mutual understanding and long term information to support the governance of aquaculture.

Costs and revenue of Mediterranean seabass and seabream farms in esteros (2011)



Rethinking industry development to cope with development issues

This questions the validity and viability of an initial development often supported and driven by subsidies but poorly positioned in the long term.

The "just produce" of the initial development is no longer sufficient to ensure the development and its sustainability.