

## CERES storyline - sea bream and seabass in the Eastern Mediterranean

### What do we expect under climate change?

Sea bass and sea bream farming in the Mediterranean is generally carried out in off-shore cages or semi-offshore cages. Climate related changes such as changes in sea surface water temperature, sea level rise, increased frequency of extreme events (e.g. storms, floods, drought) and other oceanographic variables (wind velocity, currents and waves) would have a negative impact on marine aquaculture in cages. Stress due to increased water temperature and oxygen demand, eutrophication and toxic events e.g. harmful algal blooms, increased incidents of diseases and parasites and large waves and storms are some of the climate change related challenges for marine aquaculture sector.

### How vulnerable are seabass and sea bream?

Off-shore cage operations are extremely open to changes in oceanographic variables e.g. wind velocity, currents and waves. Along with rise in sea water temperatures changes in oceanographic variables would have physiological impact on farmed species and create operational challenges for fish farmers.

### What are the economic consequences?

Physiological impact of climate related changes on sea bass and sea bream and emerging operational problems at off-shore farming sites would not only mean an increase in capital investment for more sophisticated off-shore facilities and production costs but could also lead to lower profitability levels in marine cage farms. What are the challenges?

### What are the challenges?

One of the most important challenges for sustainability of marine aquaculture sector is to develop mitigation or adoption tools and strategies with respect to impact of climate change on farmed species and thus farming operations. To this end, projecting direct and indirect impacts of climate change on productivity and financial performance of sea bass and sea bream farms is crucial for addressing climate change related challenges. In this respect CERES sea bass/sea bream-storyline is a proactive approach for projecting the impact of climate change on productivity and financial performance of marine aquaculture farms.



## What is the working program in CERES?

A series of field studies will be conducted to collect environmental, bio-technical (e.g. growth rates, mortalities, FCR, stocking densities, diseases outbreaks), structural and financial data from Turkish sea bass/sea bream farms.

The aim is to contribute to modeling the direct effects of climate change on farmed sea bass and sea bream and further to construct theoretical farms for examining the impact of climate change on productivity and financial performance of marine cage farms.

Collected bio-technical, structural and financial data from marine cage farms will be used to construct virtual Turkish sea bass/sea bream farm according to "Typical Farm" approach (Lasner et. al., 2016).

Based on project findings regarding the direct effects of climate change on sea bass and sea bream, the impact of climate change on productivity and financial performance (e.g. production costs, profitability) of Turkish sea bass/sea bream farms will be simulated on engineered virtual farm using the "Agri benchmark Simulation Model TIPI-CAL (Deblitz & Zimmer, 2005).



## Literature

Deblitz & Zimmer (2005) A standard operating procedure to define typical farms, [http://literatur.thuenen.de/digbib\\_extern/dk038513.pdf](http://literatur.thuenen.de/digbib_extern/dk038513.pdf)

Lasner et al. (2017). Establishing a benchmarking for fish farming – Profitability, productivity and energy efficiency of German, Danish and Turkish rainbow trout grow-out systems. *Aquaculture Research*, doi:10.1111/are.13144

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This project receives funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 678193 (CERES, Climate Change and European Aquatic Resources).

