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MEDAC advice on the need of the ecosystem approach implementation in the Adriatic Sea

Given that:

- at the Adriatic FG meeting held on 22 November 2022, Vanja Čikeš of the Croatian institute IZOR presented the most recent anchovy and sardine stock assessment results with reference to the Adriatic Sea (slides attached);
- where anchovy stocks are concerned, the assessment carried out in May 2022 by the GFCM updated the 2020 benchmark with a further two years of data, it was shown that fishing mortality for age class 1 was quite stable over the time series considered, reaching its highest value in 2014 (1.140), decreasing to 0.928 in 2021. Spawning stock biomass shows an upward trend until 2006 (51 000 tonnes) after which it decreases constantly until 2016 (20 000 tonnes), increasing to 24 000 tonnes in 2021;
- recruitment follows a similar trend, it is quite stable at the beginning of the time series recording the highest quantities in 2007 (131 million individuals), after which there was a steadily decreasing trend until 2021 when 83 million individuals were recorded;
- in the light of the above, the stock is considered overfished (F/Fmsy=1.15) with biomass above the reference limits (B/Bpa=1.10, B/Blim =1.45), consequently, the advice is to reduce fishing mortality.
- For sardine, the model for the 2020 assessment, while modified with 2022 data, still shows same shortcomings. This assessment document included all the uncertainties already detected in the previous one, although more investigated (e.g., lack of information on ages, potential issues related to trends on mean length and age data, low cohort signals confused with trends), therefore an urgent action is required;
- the results of the model with two different parameter settings demonstrated a decreasing trend in biomass for both, however the trend in fishing mortality and recruitment in the last years was different, further highlighting the critical issues within the model itself and the instability of the assessment;
- for these reasons, the sardine stock assessment was deemed unreliable, no quantitative advice was given and therefore the precautionary approach was applied to this species, assuming a possible downward trend in spawning stock and biomass;

Given the urgency of implementing an ecosystem approach, Simone Libralato of the National Institute of Oceanography and Applied Geophysics – OGS (Trieste, Italy) during the same meeting was invited to present a study on the effects of climatic changes on fisheries and possible alternative fisheries management measures in the Adriatic Sea using a multi-species and multi-fisheries approach. The ECOSPACE model developed in the framework of the FAIRSEA project was presented. The study assessed effects of the Fishery Restricted Areas (FRAs) already implemented in the Pomo

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Pit region, the Bari Canyon and the planned one in the North Adriatic Sanctuary region, as well as other management measures like banning the trawling up to 6 NM from the coast and reduction of effort for trawlers. The approach allowed also representing projected effects of climate change on species and fisheries catches.

Results of the ecosystem approach presented highlighted that management measures can have important and divergent effects on different commercial species (e.g., reduction of fishing mortality of a predator like hake can result in decrease of biomass of their prey, such as anchovy) because of cascading effects that are emerging only when technical and ecological interactions among multiple species are considered. Testing different management alternatives with the ECOSPACE model provided evidence of the effect of each individual measure and thus provide evidence of their comparative ecological efficacy: e.g., well chosen FRAs appear to be more meaningful than banning trawling up to 6NM. The climate change too is negatively affecting productivity in the basin with cascading effects on marine communities. Results also show that consistent reduction of fishing effort (same order of those foreseen in the MAP) initially imply a period with diminished catches (as expected). However, in the medium-term (after 10 years) the rebuilding of biomasses at sea is leading to an increase in catches of the target species 5% higher than before the introduction of effort reduction resulting in an overall increase in the efficiency of fishing activities, which might be even more relevant if considered in economic terms.

The ECOSPACE approach, albeit presented as leaving room for improvement, seems promising for including several impacts and effects. It was discussed, however, that other factors such as the effects of changes in inputs of nutrients, for example, need to be considered. Furthermore, it was discussed that the approach provides an ecological perspective, while socio-economic dynamics are missing.

It is the MEDAC's view that:

1. any decision regarding resource management in the Adriatic should be taken after a socioeconomic impact study has been carried out with reference to the foreseen measures;
2. where the management measures adopted to date have led to positive results, these should be maintained so as not to create further disruption to the sector and to the balance achieved with difficulty;
3. the different predictive models used for the assessments should provide stable, consistent results;
4. henceforth, the implementation of the ecosystem approach is indispensable and urgent, introducing information into the modelling that takes into account the impact of climate change and changes in nutrient availability;
5. it would be appropriate to assess the effects that EU and national policies for the protection of soil and water on land (e.g., Directive 2000/60/EC - the Water Framework Directive; Directive 91/676/EEC - the Nitrates Directive) have on the sea and its resources, so as to

achieve a balance between inflows and catches with the aim of optimising the quantity of phytoplankton and zooplankton, and of nutrients in general;

6. joint (rather than separate) management of anchovy and sardine stocks should be envisaged, also taking into account the current crisis due to high fuel costs;
7. it would be desirable for all the MS in the Adriatic basin to proceed with the swift activation of the measures envisaged in the EMFAF in support of enterprises struggling with the reductions envisaged in the GFCM recommendations. The socio-economic impact connected to the significant loss of midwater pelagic trawl and purse seine fishing enterprises on both sides of the Adriatic must be mitigated with the available financial tools.