D3.3.2

Document on guidelines to implement SSF resilience to Climate Change in the Sustainability Protocol

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Resilience definition

According to Holling (1973), ecological resilience was defined as the amount of disturbance that an ecosystem could withstand without changing self-organized processes and structures (defined as alternative stable states). This definition can be easily applied also to socio-ecological systems as those represented by the fishery systems. In order to adapt to climate change impacts, fishing activities have to increase their resilience.

Possible effects of climate change on fishing activities (see Introduction of D3.3.1)

The impact of climate change on the world's ecosystems and the cascading consequences for human societies is one of the grand challenges of our time (Vermeulen et al., 2012; Mora et al., 2018; Smith & Myers, 2018). Studies in the last decade (Mora et al., 2013; Rosenzweig et al., 2014; Lotze et al., 2019) revealed that climate change, especially shifts in ocean temperatures, affect fisheries in different ways such as in productivity and redistribution changes. Fish and marine invertebrates respond to ocean warming through distribution shifts, generally to higher latitudes and deeper waters. As a result of these recurrent and rapid shifts, the world is increasingly experiencing what scientists refer to as the 'tropicalization' of catches (Cheung et al., 2010) where fish stocks redistribute across latitudes, affecting the catch patterns of fishing industries. Specifically, through this process, the maximum catch potential declines considerably in the southward margins of semi-enclosed seas while it increases in poleward tips of continental shelf margins. These problems become critical factors for the survival of species, especially in a semi-closed basin, such as the Adriatic Sea, where species do not have the chance to move to higher latitudes to avoid warming of the waters, being in a real "cul-de-sac" (Lasram et al., 2010), while an increasing number of thermophilic taxa have been reported to be expanding northward (Dulčić et al., 2004; Azzurro et al., 2011).

Policy decisions on mitigation and adaptation strategies require understanding, anticipating, and synthesizing these climate change impacts. Central to these decisions are assessments of:

- the extent to which impacts in different food production sectors can be compensated,
- the consequences for human societies,
- the potential benefits of mitigation actions.

Within this context, the implementation of both adaptation measures (e.g. capability to exploit new market opportunities) and mitigation measures (e.g. reduction of CO_2 emissions), have to be considered in a protocol aiming to increase sustainability if fishing activities.

Adaptation measures (see D3.3.3 for further details)

Climate change acts on biodiversity in a variety of ways, such as causing changes in the trophic network – favouring the intake of thermophilic alien species, often in competition with local ones – and altering the biological cycles of acclimatised marine species to temperate-cold climates. Regardless of these ecological effects of the species replacement, however, from a socio-economic point of view, these new species could represent a resource for SSF operators, if they put in place new strategy of selling their landings.

Mitigation measures

There are two main tools that will allow to mitigate the contribution to climate change by the SSF sector:

- the emissions inventory: to put in place a procedure for considering all the possible sources of emission in the entire fishing cycle and assessing them,
- the mitigation plan: based on the inventory to prepare a mitigation plan that, considering all the different phases of the fishing process, identify all possible interventions for reducing emissions (e.g. optimizing the activities in terms of travel).

Within this context, "members will be committed to reduce the carbon footprint, reducing emissions from their activities, for example by operating on fuel consumption and avoiding waste". Furthermore, "the participating fishermen are committed to reduce CO_2 emissions (as individuals or as a group), in particular to:

- undergo consumption monitoring, by collecting data aimed at calculating specific indicators,
- activate procedures to reduce fuel consumption, for example by preferring fishing areas closer to the port of afference,
- assess the opportunity to make their boat more efficient (including through access to dedicated funding).

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