

ECASA indicator

<b>Name</b>	<b>Total Organic Carbon</b> (surface sediment)
<b>DPSIR class</b>	Impact
<b>ECASA sub-group</b>	Sediment
<b>ECASA code</b>	TOCSURF
<b>Proposed by participant</b>	14 – University of Venice
<b>Definition, computation,</b>	A "relative" rank can be obtained by considering the ratio between the value of the measure at the impacted and reference site. An enrichment in sediment TOC between 40 and 60 % was detected beneath off-shore mussel farms located at different european sites (Aleffi et al., submitted; Chamberlain, 2002), see tab. 1. The calculation of this ratio, implies the application of a control or multi-control sampling strategy (Danovaro et al., 2004; Chamberlain, 2002; Porrello et al., in press).
<b>Data required</b>	Organic Carbon concentrations are expressed as % of C in sediment. The concentration can be referred to the whole 6 to 10 cm core or to the surficial sediment (1 to 1.5 cm) (Chamberlain, 2002; Aleffi et al., submitted to ICES).
<b>Summary, scientific meaning, implementation</b>	The production of biodeposits (faeces and pseudofaeces) due to mussel cultivation, can cause an increase in the flux of organic carbon towards the sediment and, thus, to an enrichment of organic matter in the sediment. In turn, this process leads to an increase in the bacterial degradation activity, which causes a depletion of dissolved oxygen in the interstitial water and an increase in the sulphide concentration, since, in the absence of DO, sulphate reduction is one of the main organic matter degradation paths in marine waters (Kristensen, 2000).
<b>Range of validity</b>	
<b>Species concerned (fishes/molluscs)</b>	All
<b>Related type of aquaculture</b>	Shellfish culture: <ul style="list-style-type: none"> <li>• Longlines (Aleffi et al., submitted; Martincic 1998; Chamberlain, 2002)</li> <li>• Rafts (Chamberlain, 2002)</li> </ul> Marine cages (Porrello et al., in press)
<b>Relevant environments for this indicator</b>	Sheltered areas (Chamberlain, 2002). Coastal waters not protected by bays (Aleffi et al., submitted; Martincic, 1998).
<b>Geographic scale</b>	local
<b>Direct relevance to objectives</b>	A
<b>Clarity in design.</b>	A
<b>Realistic collection or development costs</b>	B
<b>High quality and reliability</b>	
<b>Appropriate spatial and temporal scale</b>	B
<b>Obvious significance</b>	B

**advantages**

**disadvantages  
references**

May feed Organic Carbon deposition models, as DEPOMOD (Cromey et al., 2002)

- Aleffi, I.F., Bettoso, N., Solis-Weiss, V., Tamberlich, F., Predonzani, S., Fonda-Umani, S., submitted to ICES – Journal of Marine Science. Effects of suspended mussel culture on the macrozoobenthos in the Gulf of Trieste (Northern Adriatic Sea, Italy).
- Danovaro et al., 2004. Sustainable impact of mussel farming in the Adriatic Sea (Mediterranean Sea): evidence from biochemical, microbial and meiofaunal indicators. *Marine Pollution Bulletin* 49: 325-333.
- Chamberlain, J., 2002. Modelling the environmental Impacts of Suspended Mussel (*Mytilus edulis* L.) Farming. Ph-D Thesis, Napier Univeristy, Edimburgh.
- Christensen, P.B., Glud, R.N., Dalsgaard, T., Gillespie, P., 2003. Impacts of longline mussel farming on oxygen and nitrogen dynamics and biological communities of coastal sediments. *Aquac.* 218: 567-588.
- Martincic, B., 1998. Modello di Carrying capacity applicato alle mitilicoltura in sospensione. Ph-D Thesis in aquaculture, University of Florence, Pisa and Udine. Porrello, S., Tomassetti, P., Manzueto, L., Finioia, M.G., Persia, E., Mercatali, I., Stipa, P., in press. The influence of marine cages on the sediment chemistry in the Western Mediterranean Sea. *Aquac.*
- Porrello, S., Tomassetti, P., Manzueto, L., Finioia, M.G., Persia, E., Mercatali, I., Stipa, P., in press. The influence of marine cages on the sediment chemistry in the Western Mediterranean Sea. *Aquac.*

**State of validation  
recommendations**