

ECASA indicator

Name	ASSETS
DPSIR class	Pressure, State, Response (see under)
ECASA sub-group	Coastal zone management
ECASA code	ASSETS
Proposed by participant	N°10 – Institute of Marine Research
Definition, computation,	“The ASSESTS screening model (http://www.eutro.org) classifies eutrophication status into five classes: High (best), Good, Moderate, Poor, Bad (worst).” (Bricker et al, 2003).
Data required	For Pressure (see point 4): key nutrient concentrations; For State (see point 4): Primary eutrophication symptoms: Decreased light availability (chlorophyll <i>a</i> and macroalgal growth); Increased organic decomposition (chlorophyll <i>a</i> and macroalgal growth). Secondary eutrophication symptoms: Loss of submerged aquatic vegetation (SAV spatial coverage); Low dissolved oxygen (D.O.); Harmful algae (nuisance/toxic algae); For Response (see point 4);
Summary, scientific meaning, implementation	ASSETS is an integrated approach for eutrophication assessment. It provides an overall classification of the system by aggregating the results of three diagnostic indices (Bricker et al, 2003): 1- an index of pressure (OHI – Overall Human Influence), using a simple mass balance model based on land nutrient loading and system susceptibility; 2- a symptoms-based evaluation of state (OEC – Overall Eutrophication Conditions), calculated by aggregating primary and secondary eutrophication symptoms (using a combination matrix). The symptoms are evaluated using a logical decision process (Bricker et al, 2003) applied to the variables chlorophyll <i>a</i> and macroalgae for the Primary Symptoms Method (PSM) and dissolved oxygen, submerged aquatic vegetation (SAV) loss and nuisance and toxic algal blooms for the Secondary Symptom Method (SSM). 3- and an indicator of management response (DFO – Definition for Future Outlook), determined based on an assessment of the susceptibility of the system and its foreseeable evolution and is graded to five classes (from best to worst): Improve High, Improve Low, No Change, Worsen Low and Worsen High.

ECASA indicator

Range of validity	Based on Bricker et al, 1999, 2003	Example for chlorophyll a (Chl a)
	Low impact (Low)	< 5µg Chl a l ⁻¹
	Moderate impact (Medium)	5-20 µg Chl a l ⁻¹
	High impact (High)	20-60 µg Chl a l ⁻¹
	Unacceptable impact (Hypereutrophic)	> 60 µg Chl a l ⁻¹
Species concerned (fishes/molluscs)	All	
Related type of aquaculture	ALL of the following -Cage aquaculture -Longlines -Intertidal, extensive aquaculture	
Relevant environments for this indicator	Sheltered marine and estuarine areas (bays, fjords, estuaries)	
Geographic scale	Local to regional	
Direct relevance to objectives	A	
Clarity in design.	A	
Realistic collection or development costs	B	
High quality and reliability	A	
Appropriate spatial and temporal scale	A	
Obvious significance	A	
advantages		
disadvantages		
references	<p>Bricker S.B., C.G. Clement, D. E. Pirhalla, S.P. Orlando, and D.R.G. Farrow. 1999. National Estuarine Eutrophication Assessment. Effects of Nutrient Enrichment in the Nation's Estuaries. http://spo.nos.noaa.gov/projects/cads/nees/Eutro_Report.pdf</p> <p>Ferreira, J.G., Simas, T., Nobre, A., Silva, M.C., Schifferegger, K., & Lencart-Silva, J., 2003. Identification of Sensitive Areas and Vulnerable Zones In Transitional and Coastal Portuguese Systems. Application of the United States National Estuarine Eutrophication Assessment to the Minho, Lima, Douro, Ria de Aveiro, Mondego, Tagus, Sado, Mira, Ria Formosa and Guadiana systems. INAG/IMAR, 2003. http://www.eutro.org/documents/NEEA%20Portugal.pdf</p> <p>Bricker, S. B., Ferreira, J.G. and Simas, T., 2003. An integrated methodology for assessment of estuarine trophic status. Ecological Modelling, 169: 39-60.</p>	

ECASA indicator

Nobre, A. M., Ferreira, J.G., Newton, A., Simas, T., Icely, J. D. and Neves, R., 2005. Management of coastal eutrophication: Integration of field data, ecosystem-scale simulations and screening models. *J. Mar. Sys.* In Press

ECASA indicator

State of validation

This model has been applied to a number of areas, including 138 U.S. estuaries, 10 estuaries and coastal bays in Portugal, and systems in Ireland, Germany and China. A full list is available at <http://www.eutro.org/syslist.aspx>

recommendations