From collecting data to the development of marine environmental status monitoring tools: The new level of Citizen Science

Turicchia Eva[1,2], Cerrano Carlo[2,3], Ghetta Matteo[4], Abbiati Marco[5] and Ponti Massimo[1,2]

[1] Dipartimento di Scienze Biologiche, Geologiche e Ambientali (BiGeA), Università di Bologna, Via S. Alberto 163, 48123, Ravenna, Italy
E-mail: eva.turicchia2@unibo.it
[2] Reef Check Italia onlus, c/o Dipartimento di Scienze della Vita e dell'Ambiente, Università Politecnica delle Marche, Via Brecce Bianche, Monte Dago, 60100, Ancona, Italy
[3] Dipartimento di Scienze della Vita e dell'Ambiente (DiSVA), Università Politecnica delle Marche, Via Brecce Bianche, Monte Dago, 60100, Ancona, Italy
[4] Faunalia, Piazza Garibaldi 5, 56025, Pontedera, Italy
[5] Dipartimento di Beni Culturali (DBC), Università di Bologna, Via degli Ariani, 1, 48121, Ravenna, Italy

In recent years the involvement of citizens in environmental monitoring has increased worldwide. Citizen science (CS) projects on marine environment have spread up from tropical coral reefs to temperate habitats. Besides its relevant role in environmental education and increase people awareness, the advantages of CS approach lie in expanding our ability to collect information and data in space and time, in the face of limited investments.

Since 2006, trained scuba diver volunteers are collecting data on the distribution and abundance of 43 easily identifiable selected key marine species along the coasts of the Mediterranean Sea, by applying the Reef Check Mediterranean Underwater Coastal Environment Monitoring (U-CEM) protocol (www.reefcheckmed.org). The growing need to assess the environmental status of Mediterranean habitats and the large availability of data collected by Reef Check Mediterranean volunteers along subtidal rocky habitats suggest the possibility to develop innovative and reliable biotic indices that may support decision makers in applying conservation strategies, especially in Marine Protected Areas (MPAs). The proposed Reef Check Mediterranean Species Sensitivity (***MedSens***) index is based on U-CEM data and on the sensitivities of the selected species toward the disturb agents indicated by the Marine Strategy Framework Directive (MSFD, 2008/56/EC). Species sensitivities were assessed following the Marine Evidence based Sensitivity Assessment (MarESA; www.marlin.ac.uk) approach, developed by the Marine Life Information Network of the Marine Biological Association of the UK. This approach takes into account both the resistance and resilience of the selected species against each considered pressure, which are defined according to benchmark levels and detailed literature review.

MedSens index provides the mean sensitivity of the surveyed assemblages towards three main categories of human (physical, chemical and biological) pressures. The greater the average sensitivity of the assemblages, the lower is the extent of the disturbances to which they are subjected. Coastal marine assemblages rich in sensitive species provide evidences of a good environmental status, as required by the MSFD. This index may help not only to assess the environment quality status but also to identify the most likely sources of disturb acting in the study area.

MedSens index can be easily calculated by scientists and managers in each area and period of interest by using the open access U-CEM data and a plugin developed for the QGIS platform, a free and open-source desktop geographic information system. This allows a large amount of biological information, gathered by volunteers, to be synthesized and made available for scientific and management purposes. Thanks to ***MedSens***, the Reef Check Mediterranean project can provide a real contribution to marine biodiversity conservation, a new step forward for the citizen science.

Keywords: coralligenous habitats; rocky bottoms; biotic indices; anthropogenic impacts; geographic information system; Mediterranean Sea