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IMPLEMENTATION OF A GEOREFERRED UNDERWATER TOWED CAMERA SYSTEM IN A METHODOLOGICAL APPROACH TO THE MONITORING OF POSIDONIA MEADOWS IN LIGURIA, ACCORDING TO THE WATER FRAMEWORK DIRECTIVE (WFD) 2000/60/EC

IMPLEMENTAZIONE DI UN SISTEMA BASATO SU TELECAMERA SUBAQCUEA GEORIFERITA NELL'APPROCCIO METODOLOGICO AL MONITORAGGIO DELLE PRATERIE DI POSIDONIA IN LIGURIA, AI SENSI DELLA DIRETTIVA QUADRO SULE ACQUE 2000/60/CE

Abstract – *In the last two years (2008-2009) a new instrument based on a georeferred underwater towed camera system, called Tritone, was applied coupled with traditional scuba diving methods for the monitoring program of* P. oceanica *meadows in Liguria according to the WFD. This innovative approach allowed for the collection of all data, that the application of the most biological quality indices requires, with less work time and staff effort.*

Key-words: Posidonia oceanica*, underwater towed camera, georeferenced video transects, biological quality element, water framework directive.*

Introduction – Referring to Water Framework Directive 2000/60/CE (WFD) criteria, each water body has to be classified, using information from monitoring, and management politics have to be adopted, in order to achieve or maintain a good water status by 2015.
The ecological status required by the WFD is defined by some Biological Quality Elements (BQE) and *Posidonia oceanica*, because of its sensitivity to anthropogenic pressures, was chosen for the Mediterranean area as the angiosperm BQE. In Liguria *P. oceanica* meadows are present in 16 water bodies on the whole 26 considered by the marine environment monitoring program, according to the WFD. Two different but integrated ways of monitoring meadows are applied: traditional, based on visual observations and sampling by scuba divers; innovative, based on the recording of images of *P. oceanica* meadows by an underwater towed camera, called "Tritone System". This double method allows for the recovery of the major pieces of information with no excessive economic and resources effort. Although underwater video-cameras were often implemented in sea-grass and benthic monitoring (Bianchi *et al*., 2003; Rooper & Zimmermann, 2007), also in the Ligurian Sea (Piazzi *et al.* 2000; Diviacco & Coppo, 2006), this is the first attempt for a standardization of a such technology in a regional activity of water classification.

Materials and methods – Tritone is a new integrated system developed by OLPA-RSTA with the purpose of conceiving a fast methodology to investigate coastal sea-bottom and benthos assemblages, integrating Eco-sounder information and DGPS positioning technology to georeferencing filmed transects in real time. Tritone was developed, in relationship with the project "Interreg IIIB: "POSIDONIA", with the objective of elaborate the products of traditional underwater video-cameras monitoring

systems in order to be consulted and queried by GIS software. After the cartographic elaboration, performed using GIS MapInfo®, a specific video-player software allows surfing interactively trough the map and get information of the meadows, by the videos. In summers '08 and '09, respectively 9 and 2 water bodies were monitored (on the 5 expected in 2009, survey in progress). Tritone system was applied carrying underwater videos conducted along transects perpendicular to the shoreline and crossing the sampling points and the lower limit. Video-transects have been settled down in order to implement traditional data, acquired by scuba divers (operating in 2 points settled at 15m depth in each meadow) and to obtain data on lower limit descriptors, such as limit type and limit depth.

Results –Tritone was applied in 19 transects in 2008 and 3 transects in 2009, concerning respectively 13,000 m and 3,500 m total length, (part of 7,000 m planned for 2009). The whole recording time, considering all videos, is about 4 hrs, so the average velocity is about of 2.2 knt. On the whole the mean depth for the lower limit is 21 m, with the shallower one obtained at Cogoleto (18.1 m) and the deepest obtained at Imperia (32.1 m). Among the 18 meadows monitored in the 11 water bodies, 9 meadows had sharp limit, 5 regressive and 4 progressive.

Conclusions – The Tritone System provides information about lower limit, for deeper and wider surface as well, where scuba diving study is critical and too expensive. It allows also getting more data at 15m depth, in addiction or correction to data acquired by diving. This new approach, coupled with traditional monitoring activities, allows in less time and money, the collect of the data required for the application of all biological indices, actually proposed by scientific institutions, such as the PosWare (Buia *et al.*, 2005), the BiPo (Lopez Y Royo, 2008) and the PREI (Gobert *et al.*, 2009). One of them should be chosen as the official one, to be applied by Italy and maybe by other Mediterranean European countries, for future monitoring activities.

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