

## **Divers for the Environment: Volunteers and Scientists in Marine Biodiversity Monitoring**

Stefano Goffredo<sup>1</sup>, Patrizia Neri<sup>1</sup>, Antonio Orlandi<sup>1</sup>, **Francesco Pensa<sup>1</sup>**, Maria Scola Gagliardi<sup>1</sup>, Angela Velardi<sup>1</sup>, Corrado Piccinetti<sup>2</sup>, Francesco Zaccanti<sup>1</sup>

<sup>1</sup>Department of Evolutionary and Experimental Biology, University of Bologna,

<sup>2</sup>Laboratory of Fisheries and Marine Biology at Fano, University of Bologna

Global monitoring of the biodiversity status is recognized as a priority necessity by the international scientific community. Research institutes often lack funds and necessary manpower to perform large scale monitoring. For land environments it has been shown that citizens can be involved in research, by contributing significantly to the collection of data. Underwater research requires special operational skills and SCUBA certification, and it may be difficult to involve large numbers of volunteers. We show that, in a short time, thousands of recreational divers can be recruited for monitoring the marine biodiversity status. On a specially formulated questionnaire, volunteers reported the presence of 61 marine taxa encountered during recreational dives. During the 4-year study, 3825 divers have completed 18,757 questionnaires, corresponding to 13,539 diving hours. The volunteer sightings-based index showed that in the monitored area the environmental quality did not change significantly on the time scale, but it had a significant correlation with latitude, suggesting improvement in the southernmost areas. This condition could be related to the main presence of stressors in the northern areas, and has been corroborated by professional investigations. Our experience shows that recreational divers can collect a considerable amount of data, over a vast geographical area, thus decreasing the costs for research institutes. The greatest drawback with this collaboration is the difficulty to obtain sampling distributed uniformly in space. Projects that invite citizens to get involved in ecological research provide members of the community of every age valuable opportunities to improve their science literacy and environmental awareness. This research, patronaged by the Italian Ministry of the Environment, was supported by the ASTOI-Association of Italian Tour Operators, the Association of Diving

agencies operating in Italy (IDEA, PADI, PSS, SNSI, SSI) and the popular scientific magazine Quark.