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Scientific diving: towards European harmonisation

In the European Union, almost half of the population presently lives within 50–60km from the sea, and marine and coastal zone resources produce much of the EU's economic wealth. While fishing, shipping and tourism industries all compete for vital space along the estimated 90 000km of coastline, coastal zones contain some of Europe's most fragile and valuable natural habitats and archaeological heritages. Surveying and assessing the status quo and the future changes of coastal habitats are therefore key priorities for marine science in the coming decades. This is particularly important in the light of tremendous forthcoming challenges, such as:

- fast changing human demography resulting in a rise in coastal populations and rapid coastal urbanisation;
- increasing tourism, resulting in coastal zone development and degradation;
- increasing demand and overexploitation of living and non-living resources;
- conflicting uses of the marine environment (e.g. fish/shellfish farming, boating, recreational diving, mineral/oil/gas extractions, wind farms);
- global change (i.e. increasing frequency of extreme events and rise in superficial water temperature, sea level rise, sea water acidification, diseases and mass mortality events).

Another key priority for marine science is to support all the ambitious efforts within the EU Sustainable Development Strategy (SDS) and the Marine Strategy Framework Directive (MSFD). All these issues require advancement in marine biology, geology and archaeology that improves our knowledge of natural processes affecting biodiversity and functioning. It must also address the human impact and improve ways to mitigate it (e.g. designing ecologically active coastal and marine infrastructures, and developing innovative restorations techniques), as well as develop innovative technologies which support these actions.

The European Scientific Diving Panel (ESDP) of the Marine Board of the European Science Foundation and the Italian Association for Scientific Divers (AIOSS) convened the 3rd International Symposium on Occupational Scientific Diving (ISOSD) in November 2011 in Porto Cesareo, Lecce (Italy). This event was organised in collaboration with the Italian Federation of Underwater Archaeologist (FAS), and with the patronage of the Porto Cesareo MPA, Puglia Region and Tourism Promotion Agency of Lecce. More than 70 delegates, from nine countries, attended the biennial event to present new research and to discuss the future of scientific diving as a tool for scientists involved in a large field of studies – from biology and geology, to innovation technology and archaeology.

The symposium focused on four main topics: *(a)* scientific diving techniques and experimental approaches to investigate bioecological processes; *(b)* scientific diving as a tool in remote or difficult places; *(c)* new technology in underwater science; and *(d)* maritime archaeology and coastal landscape. Overall, 33 oral communications and 15 posters were presented and are summarised in the book of abstracts, available for free on the AIOSS website (www.aioss.info).

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The success of the event, compared to those held in previous years, testifies to the growing interest and awareness of the European scientific community towards scientific diving. Indeed, the symposium was also the occasion for two stimulating and animated round table discussions on legislation and safety, and on the appropriate training path for scientific divers, focusing on globally available, working scenarios.

Scientific diving is nowadays widely recognised by the scientific community as a valuable and effective underwater research

tool, which allows for direct observations, accurate sampling and experimental manipulations that would otherwise be impossible. Nevertheless it is clear that there is a lack of harmonisation under several aspects (e.g. training, standards, methods and approaches) and among countries and/or disciplines. Despite the efforts of the ESDP and of the national offices, this undoubtedly still poses limits to the exchange of researchers and to the collaborations both within and outside Europe.

Several countries do not have a national authority, regulation and/or governmental agency providing the legal background for scientific diving. For instance, in Italy there is a long tradition concerning scientific diving, and in May 1997 a European scientific diving course was held at Elba Island (Italy), giving one of the first contributions to the strategy of the European Scientific Diving Committee (ESDC). It also suggested a draft standard for European Scientific Divers (ESD) and Advanced European Scientific Divers (AESD), which was formalised during the workshop of the ESDC held at Banyuls sur mer (France, October 2000).

Although legislative proposals are under discussion, in Italy there are no national regulations for the conduct of scientific dives, so instead local rules, set and enforced by port authorities whenever available, are applied. Italy has become a full member of the ESDP in 2010 by establishing a national scientific diving steering body, AIOSS (formally Associazione Italiana Operatori Scientifici Subacquei), which represents the scientific diving community through a number of major institutions of the country. Among the individual members are technicians, researchers and academics from universities, research institutes and public agencies, operators and managers of marine protected areas, nature reserves, marine archaeological sites and aquariums, as well as freelancers and employees of private studies of environmental consulting, engineers and doctors.

AIOSS liaises with the Working Committee of the Chamber of Deputies and other associations to promote legal recognition of scientific diving in Italy. It releases the ESD and AESD certificates based on the rigorous application of the ESDP standards. These standards simply define the minimum basic training of a scientific diver as needed for mobility and as a basic training level on which the employer can build further training modules.

In reality, scientific diving is not a prerogative of academies and, as a discipline, involves a wide range of occupational scientific diving, as demonstrated by the interventions at the 3rd ISOSD. While in most cases the ESD and AESD certificates are issued to members of permanent and contract staff, research students, technicians and trainees of research institutions, in Italy the requests of these certifications often come from freelancers and employees of consulting companies. This verification process involves a careful evaluation of the curricula and of the scientific background of applicants, which is more restrictive of what is provided in the ESDP standards.

The training of the next generation of scientific divers strongly calls for international multidisciplinary and complementary training programmes. Considering the needs of scientific divers from different European countries, it will be even more urgent to implement a shared approach to guarantee standardisation in diving activities. This can be achieved by joint networks, involving both public and private sectors, which could be supported by European actions.