

# PLANNING OF MARINE PROTECTED AREAS: USEFUL ELEMENTS TO IDENTIFY THE MOST RELEVANT SCUBA-DIVING SITES

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## Abstract

Recreational scuba diving is a relevant activity for the success of marine protected areas (MPAs). The case-study of the proposed MPA of Rđum Majjiesa and Ras ir-Raheb (NW Malta) illustrates the key-elements that should be considered in the definition of the scuba-diving attractive sites map, which is an important component for the planning of coastal MPAs.

**Keywords :** Coastal Management, Marine Parks, Mapping.

Recreational scuba diving is a relevant activity for the success of marine protected areas (MPAs); it allows visitors to appreciate the effects of protection on marine biota, and can financially support MPAs [1] though it needs to guarantee a sustainable use of the marine environment. For these reasons the planning of new coastal MPAs should take into account the collection of data useful for the future management of scuba activities in the framework of the wider MPA management scheme.

The Italian Central Institute for Marine Research elaborated a zoning proposal [2] and a management plan for the marine area of Rđum Majjiesa and Ras ir-Raheb (NW Malta) (fig.1).

Tab. 1. Matrix applied to calculate intensity values

Sectors	a	b	c	d	e
<b>Variables</b>					<b>(cave)</b>
Benthos (aesthetic value)	3	3	3	2	3
Abundance	2	3	2	2	2
Diversity	2	3	2	2	2
Size	3	1	3	1	1
Uncommon species	2	1	2	1	1
Visibility	2	2	3	3	2
Access	1	2	1	1	2
Geomorphology	3	2	3	2	3
<b>TOTAL</b>	<b>18</b>	<b>17</b>	<b>19</b>	<b>14</b>	<b>16</b>

The activity, conducted in 2002-2004 and coordinated by the Regional Activity Center for Specially Protected Areas, involved the collection and analysis of environmental and socio-economic data, including recreational scuba diving activities. The present paper centers on the relevant aspects that were considered in the identification process of the most important recreational scuba diving sites. The study area was previously known to host some diving activities but no data was available to determine scuba-diving site locations. For this reason, information collected from local experts was used in the preliminary identification and description of the interesting diving sites. The identified zones were implemented in a Geographical Information System (GIS) and reselected using bathymetry and geomorphologic spatial data (layers) derived from previous studies. The bathymetry was used to identify stretches of seafloor with scuba-diving depth ranges, while the geomorphology was used to reselect the specific seafloor typologies that are of interest for diving: screes and vertical or terraced rock walls. Each resulting sector was classified through the main environmental features (variables) which influence diving site selection as identified in previous studies [3]. The variables considered were: *geomorphology*, spectacular seascapes (shallows, caves etc.); *benthos*, highly aesthetic benthic species (i.e. *Paramuricea clavata*, *Corallum rubrum*); *abundance*, high specimen density (i.e. shoal of fishes); *diversity*, species number; *size*, large specimens; *uncommon species*, rare/relevant species; *visibility*, water transparency; *access*, simplicity in reaching the dive site. Each variable was given an intensity value (importance of the variable for each sector) on a 3 level scale: 0, none; 1, low; 2, medium; 3, high. Five sectors (a, b, c, d, e) were identified and classified (tab. 1).

Figure 1 shows the distribution of the relevant sites classified according to the main environmental features that are attractive for scuba diving.

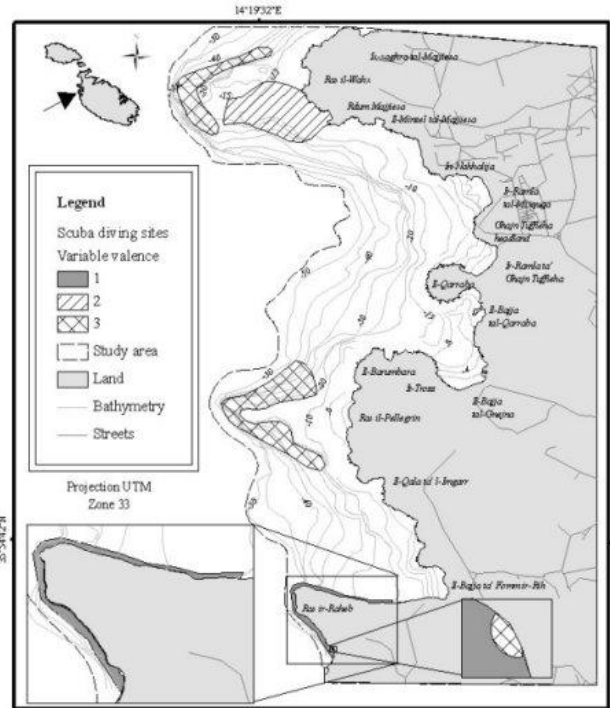


Fig. 1. Map of the relevant sites for recreational scuba diving

The approach considers the key-elements (main environmental aspects) which determine diver preference, through a standardised evaluation of the dive site potentials. Such baseline data are necessary for the development of economic recreational activities to be conducted in compliance with the MPA aims. The rendering of this type of data, in a specific layer and through a GIS, represents a scientific approach that can support an MPA's zoning and planning process, both when scuba diving activities are already existing and need to be managed (through the construction of a layer representing actual site use) or when they are yet to be promoted and developed (through the construction of a layer illustrating the potential attractive sites). The authors are grateful to Prof. P. Schembri and Dr. K. Pirrotta for their support in data collection.

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