

CETACEAN, TURTLE AND PELAGIC SPECIES AND ASSOCIATIONS IN THE CENTRAL-SOUTHERN MEDITERRANEAN SEA: IMPLICATIONS FOR CONSERVATION ACTION

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Abstract

A research area of about 120,000km² around the Maltese Islands has been the subject of year-round marine research since 1997. Various species have been studied including cetaceans, turtles, elasmobranchs, bluefin tuna and sea birds. Aerial and marine survey techniques allowed for various aspects of species distribution and spatio-temporal associations to be analysed using the data mining (association rule learning) technique. Such results have applications in maritime and conservation management.

Keywords: *Cetacea, Turtles, Birds, Conservation, South-Central Mediterranean*

Introduction

The research project stationed around the Maltese Islands is a long-term and multi-species field research effort undertaken year-round [1,2]. Mobile species' habitats are typically heterogeneous in their biological and physical properties [3,4]. Understanding the spatio-temporal distributions and multi-species associations can provide insight into the multi-species preferences essential in the development of management and conservation initiatives [3,4].

Methods

A research area of about 120,000km² around the Maltese Islands has been the subject of conservation research since 1997. Aerial and marine field research surveys were undertaken to investigate species abundance and distribution using methods adopted by Vella [1,2]. This paper focuses on a pilot consideration of associations among species studied around the Maltese Islands by using a ten-year subset of the data collected. The Data Mining (association rule learning) technique [5] was adopted.

Results and Discussion

The most regular species found in the study area include the Bottlenose (*Tursiops truncatus*), Striped (*Stenella coeruleoalba*), Common (*Delphinus delphis*) and Risso's dolphins (*Grampus griseus*), Sperm (*Physeter macrocephalus*) and Fin (*Balaenoptera physalus*) whales, the Loggerhead turtle (*Caretta caretta*), elasmobranchs, such as, the Giant Devil ray (*Mobula mobular*), and seabirds such as, the Cory's Shearwater (*Calonectris diomedea*) and the Yelkouan Shearwater (*Puffinus yelkouan*). Figure 1 shows the bar graph indicating the extent of association between the turtles, seabirds, common dolphins, bottlenose dolphins and fish scatter (different species) at the surface observed in specific areas and seasons, in the research area. With such sound data sets and effective support factor, the associations found are relevant for modelling and decision-making, such as planning spatio-temporal relevant and effective conservation management of mobile and wide-ranging species.

The use of the association rules proves to be effective in highlighting areas of interest for conservation area planning but more so for conservation management in various areas and at different times of the year. With highly mobile species it is becoming increasingly clear that with shifting favourable habitat conditions species will need to be managed for conservation through effectively mobile and adapting management rules. The extent of ecological plasticity of these species will need to be integrated through the considerations of buffer areas around such mobile management zones. To achieve high precision conservation management tools, long-term and year-round data sets are essential.

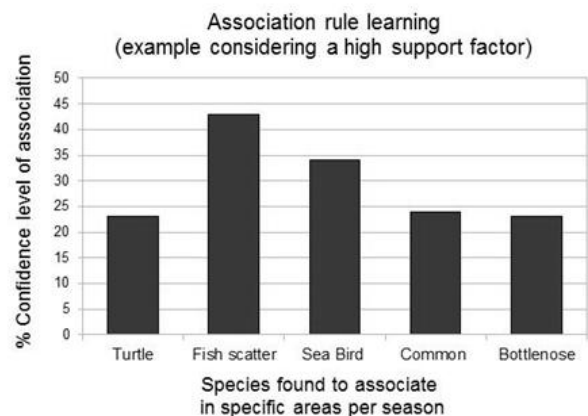


Fig. 1. Bar graph showing an example of a strong association rule learning outcome between multi-species distribution around the Maltese islands.

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