

# INTERTIDAL AND SUBTIDAL ROCKY SHORE SAMPLING METHODS: A REVIEW. ADDRESSING THE NEEDS OF WFD AND MSFD

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## Abstract

With European legislations compelling Member States to evaluate their seas, the need of comparable data and methodologies grows. In the intertidal and the subtidal rocky shores, benthic communities (flora and fauna) and macroalgal communities are the most assessed. Strategies and methodologies applied are diverse. Visual censuses are the most used strategy, while quadrats are the most applied methodology. A review of different methods is presented.

**Keywords:** *Mediterranean Sea, Algae, Biodiversity, Bio-indicators*

## Introduction

As European and international legislations are developed and applied, the necessity of comparable data grows. The European legislations (WFD and MSFD) compel Member States to determine, either, the Good Ecological Status [1], or the Good Environmental Status [2]. Rocky shores gather habitats of great importance, like macroalgal communities, which are among the principal habitats in European seas [3]. The aim of this study is to review sampling strategies and methods used across European countries, for the assessment of intertidal and subtidal rocky shores, in order to provide an overview of sampling methodologies used, and to evaluate their possible gaps.

## Material and Methods

A bibliographical search was done using online available databases, key words and applying Boolean modifiers like quotation marks or parenthesis. Scientific peer reviewed articles published from 1999 to 2015 were selected. The search was focused on European countries. A data matrix was created including all relevant information concerning the sampling strategies, methodologies and method size, as well complementary information about geographic location, biocenosis targeted, or depth range, among others.

## Results and Discussion

A total of 47 research articles were selected, all related to either intertidal or subtidal rocky shores from European seas. Biocenosis target by research articles are: Benthic communities (algae and fauna), assessed in 48.94% of the revised literature, Macroalgal communities (21.28%), Coralligenous assemblages (14.89%), Intertidal communities (10.64%) and Fish communities (4.26%) (Fig. 1). The demanding of the European legislations is reflected as well the use of macroalgae as water quality indicators. The most applied sampling strategy is visual censuses in 63.93% of the revised articles, followed by Photographic/video surveys with 21.31% (Fig. 2). Several methods are applied, being the most used: quadrats, applied in 45.9% of the revised articles, transects in 13.11%, and areas (of variable surface) in 11.48%. Most methodologies are non-destructive, which allows applying them in marine protected areas (MPA) and in protected communities. Sampling method size greatly differs among studies.

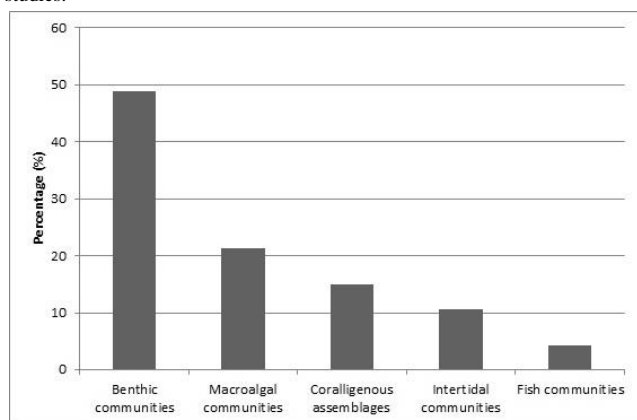


Fig. 1. Percentage of biocenosis targeted to address WFD and MSFD rocky shores extracted from revised literature (n=47 published articles), from 1999 to 2015.

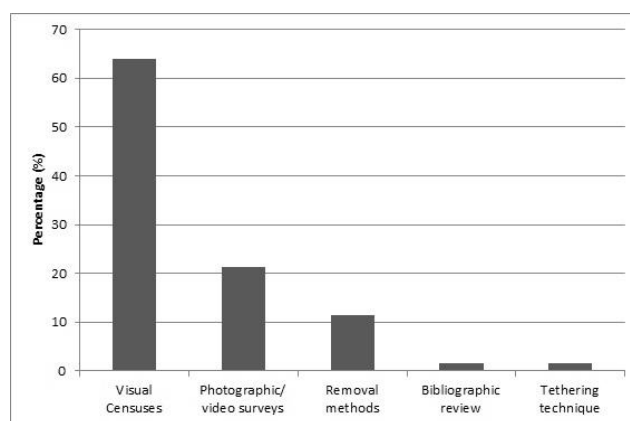


Fig. 2. Percentage of sampling strategy targeted to address WFD and MSFD rocky shores extracted from revised literature (n=47 published articles), from 1999 to 2015.

Data are gathered usually as cover percentage, number of individuals or presence/absence data. Abundance, species richness or diversity are common data calculations, among others. Taxonomic classification for the determination of organisms is done to the lowest level possible, although the use of structural or functional groups is also present in the assessments. Regarding experimental designs, time and space factors are considered, and included to evaluate variability due to this to factors.

These preliminary results highlight the vast array of sampling methods applied in rocky bottoms, indicating the need for standardization of sampling techniques to gather appropriate data for addressing environmental status at European coastal areas.

## References

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