

## **STUDY OF THE STRUCTURE, DISTRIBUTION AND DYNAMICS OF *CODIUM ELISABETHAE* POPULATIONS IN THE REEF ECOSYSTEM OF FAIAL ISLAND (AZORES), USE OF SUBMARINE IMAGE ANALYSIS**

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In the context of the Network Natura 2000, several Sites of Community Interest (SCI) were established within the Azores archipelago. In the SCI of Monte-da-Guia (Faial), two sites were delimited in order to investigate particularly the links between habitat characteristics, population structure, distribution and dynamics of the green alga *Codium elisabethae*. The first site is a large protected rocky seafloor of an ancient volcano crater (20m deep) and classified as no-go reserve. It shows very high density stands of *Codium elisabethae* (up to 105 ind.m<sup>-2</sup>), representing the main vegetal biomass. At similar depth but distant of about two kilometers, the second site is in a more exposed area, where a sparse population (about 13 ind.m<sup>-2</sup>) occupies rocky tables and boulders emerging from shallow sandy deposits. These contrasting densities reflect different population dynamic equilibrium resulting from the particular environmental pressures of each site. A two-year population survey started in August 2003, aiming principally at building submarine image mosaics of each site on a seasonal basis. Further, a computer assisted detection is run on the images to derive valuable information about the *Codium elisabethae* present. This technique allows to study a comparatively large zone regarding to the diving time invested and to focus on the particular evolution of well-localized individuals. Thus, seasonal fluctuations of growth rate (from 0.5 to 3 cm.month<sup>-1</sup>) and primary production (from 1 to 15 kg.m<sup>-2</sup>.month<sup>-1</sup>) could already be described. Further processing will allow to relate these parameters to individual size. Various sensors were deployed during a complete year for the characterization of the natural physical constraints experimented by the benthos (temperature, currents, turbidity, photosynthetic active radiation). Nutrients concentrations were quantified both in the water close to sea-bed and in the internal volume of sea water isolated by the spherical thallus of *Codium elisabethae*. This confirmed that the lumen of this alga trap and concentrate nutrients, as compared to the outer environment. These characteristics are particularly interesting as they show how important can be the links between the spatial variations of benthic habitat characteristics, the structure and dynamic of the *Codium elisabethae* populations and the role they may play on the local capture and release of nutrients at the scale of this oligotrophic reef ecosystem.