



Changes in submersed vegetation: assessing loss in ecosystem services from frondose to depauperate systems dominated by opportunistic vegetation

On coastal areas of the world, frondose vegetation (e.g. sea grasses and large brown macroalgae) exert a paramount role on community structure and function including increasing habitat complexity, protecting coastlines, filtering terrestrial run-off, sequestering and storing carbon, sequestering nutrients, and providing food and shelter for fish. Conservation and restoration of these ecosystems is important as they are currently declining worldwide. The aim of the project is to empirically quantify changes in the magnitude of ecosystem services, including supply of primary production, provision of habitat for epifauna, quality of food for epifauna, provision of habitat for juvenile fishes, and water clarity, between frondose vegetated systems and those dominated by opportunistic vegetation within three Outermost Regions: Canaries, Azores and Guadeloupe Island (Lesser Antilles).



Project achievements

- During one of our first sampling field trips in Gran Canaria Island, we collected a strange organism that proved to be a new world 'genus' - higher taxonomic unit than species (a genus typically pool several species). The new organism is a small crustacean, called *Mantacaprella macaronensis*, which has been recently described in the scientific journal *Zootaxa* (3700 (1): 159–172).

- Our study focuses on submersed marine vegetation. Despite the fact that seagrasses (marine plants) deliver essential functions and services to human well-being, estimation of the economic value of ecosystems is particularly incipient in the marine realm, where numerous ecological services still need to be evaluated. In this project, we have determined the economic value of *C. nodosa* seagrass meadows as habitat for coastal fishes targeted by local fisheries in Gran Canaria (Canary Islands, eastern Atlantic). Large-sized fishes (mostly adults), which constitute the fishable fraction, have a mean monetary value of 866 € ha⁻¹ (605.2 € ha⁻¹ represented pelagic species and 260.8 € ha⁻¹ benthic species); at the insular-scale, this value adds up to 606,239 €, which is more than a half a million €. Moreover, small-sized fishes (mostly juveniles), which replenish fisheries, were also accounted for, as these fishes use *C. nodosa* seagrass meadows as 'nursery grounds'. The monetary value of this fish production was estimated at 95.75 € ha⁻¹ y⁻¹; at the island-scale, this value adds up to 67,030.30 € y⁻¹. This strategy provides complementary assessments of the key economic contribution of seagrass meadows for coastal fisheries as both 'fishing' and 'nursery' grounds. Our approach is one of the first economic evaluations in the world of economic value of seagrass meadows as habitat for nearshore fishes.



Project goal

The management of natural systems cannot incorporate all ecological information, so simplifications of this information into a format that can advise policy-makers is a required step to better manage ecosystems. A method for simplifying ecological information into management frameworks considers provision of 'goods and services' by ecosystems. On coastal areas of the world, frondose vegetation (e.g. seagrasses and large brown macroalgae) exert a paramount role on community structure and function, e.g. increasing habitat complexity, protecting coastlines, filtering terrestrial run-off, sequestering carbon and nutrients, and providing food and shelter for invertebrates and fishes. Conservation of these valuable habitats is therefore important,



particularly since seagrass meadows and frondose brown algal beds are declining worldwide, mainly in areas of intense human activities, where these habitats are replaced by opportunistic vegetation. Because the structural and functional characteristics of ecosystems generate the services they provide, replacement of frondose vegetation by opportunistic vegetation might induce diverse impacts on ecosystem services, with some services being enhanced and others being unchanged or depressed. The aim of this project is, therefore, to empirically quantify changes in the magnitude of ecosystem services, including supply of primary production, provision of habitat for epifauna, quality of food for epifauna, provision of habitat for juvenile fishes and water clarity, between frondose vegetated systems and those dominated by opportunistic vegetation within similar areas in 3 Outermost Regions: Canary Islands, Azores and Guadalupe Island (Lesser Antilles). Adequate management of coastal areas requires such knowledge, and so we expect a transfer of our results to environmental policy-makers to take decisions under different scenarios.

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