Abstract

Seagrass meadows are highly productive and widespread marine ecosystems providing multiple ecological functions in shallow coastal waters throughout the world. The value of seagrass habitats is undisputable given that they are critical environments for thousands of animal and plant species as well as of major importance for human populations as an ecological basis for fishery production. Unfortunately, seagrass meadows have suffered progressive regressions within several coastal regions worldwide, which is mainly due to increased human influences. The concern that seagrass meadows are ecological and economical important habitats, but also largely threatened by human disturbance, stresses the need for more ecological and management-based seagrass research. The present thesis emphasizes seagrass ecology by focusing on patterns and processes, community dynamics, disturbances and management-related issues in temperate (the Swedish west coast), subtropical and tropical (the Western Indian Ocean) seagrass meadows. For an improved ecological understanding and for coastal resource management a number of major achievements have been reached.

Overall results show that community patterns of fish and epiphytic organisms are structured by different biotic and abiotic factors depending on scale, life-history traits, habitat properties and geographical position. Fish communities in the tropical coastal waters of Zanzibar (Tanzania) and Inhaca Island (Mozambique) were shown to be influenced by local-scale habitat factors (e.g. structural complexity and species composition of seagrass meadows) as well as landscape-scale geography (e.g. position due to mangrove and coral reef habitats). In the temperate Swedish coastal waters, temporal variability during the production period (June through October) was the most significant factor explaining fish community patterns. Spatial variability concerning the amount of epiphytic organisms on seagrass leaves was greater on local-scale levels (i.e. among and within seagrass meadows) than on a regional scale (100s km), with different biotic, geographical and environmental factors being important structuring forces. Hence, in order to develop predictive powerful management tools concerning ecological communities it should be important to consider spatial and temporal variability at a range of scales.

Seagrass mapping results from Chwaka Bay, a tropical embayment of Zanzibar, showed that the general seagrass distribution stayed fairly stable between mid-1980s and 2003, although some major losses and gains had occurred. In contrast, extensive seagrass losses (about 60 %) were estimated along the Swedish west coast during an equivalent time period (between 1980s and 2000). The causes are not well known, but nutrient enrichment (eutrophication) has shown to be of major importance. Our results, based on manipulative field experiments, suggest that also top-down cascading effects (from e.g. overexploited fisheries) may have negative impacts on seagrass distribution. For general mapping of seagrass meadows, satellite remote sensing was found to be a useful tool. This was specifically used for the African study, but the potential for the technique was also exemplified for Scandinavian waters.

Seagrass meadows represent an extremely valuable – but threatened – aquatic biotope for which management requires an enhanced knowledge. Future studies within the field of seagrass research should mainly focus on interactions between natural ecology and external disturbances.