PROJECT NAME	The role of two seagrass species in wave attenuance and coastal protection
ACRONYM	The role of two seagrass species in wave attenuance and coastal protection
STUDY REGION	South England
PRINCIPAL INVESTIGATOR	Robert J. Nicholls, Maike Paul, Prof. Carl L. Amos
DURATION	October 1, 2007 - September 30, 2010
PROJECT WEBSITE	-
LOICZ PROJECT DATABASE	Click here for more project information

PROJECT DESCRIPTION

Storm waves are a major cause of coastal erosion. It is known that seagrass can reduce the impact of waves at the coast by modifying the wave climate, and therefore reducing the impact of storms. However, the nature and degree of wave attenuance has not been investigated in detail and there is still a high need for laboratory and field studies to determine the influence of seagrass meadows on wave climate.

To date, investigations of the interactions of submerged vegetation and water movement have concentrated on unidirectional flow and crown building species. The results of these studies cannot be transferred to wave attenuation by meadow building plants. The boundary layer under unidirectional flow behaves differently from that under a dynamic and oscillatory flow in wave-dominated environments. Along the coasts of Great Britain and the European Shelf seas the species Zostera noltii is highly abundant.

It is recognised to have a decisive influence on food webs and material budgets, but its role in the dynamic regime is still poorly understood. In the Mediterranean the seagrass Cymodocea nodosa is a widely distributed species that is observed to replace Zostera noltii in various locations. This research aims at investigating the influence of the two seagrass species on the boundary layer and the nature of this influence in the water column. Seagrass influences the boundary layer and therefore is likely to alter shear stress. It is envisaged that this work will explore this dissipation in detail and determine the change of shear stress at the bed based on seagrass density.

Furthermore, seagrass will have an influence on the wave height and it is hypothesised that this influence will alter with water depth. Wave height is related to orbital velocity. The orbital velocity strongly determines the wave forces that act upon engineered structures and hence a decrease can have a significant influence on the structural design. In order to improve design approaches, wave height dissipation by seagrass will be investigated as well. In the future, global change will lead to increasing water temperatures and sea level rise. As seagrass species are highly adapted to specific climate conditions, this change will have a decisive influence on seagrass distribution.

If seagrass has a significant impact on the hydrodynamic conditions, seagrass loss or change will alter wave conditions in the nearshore and therefore will have implications for coastal constructions, beach management and coastal protection. The comparison of native (Zostera noltii) and potentially invasive (Cymodocea nodosa) seagrass species would help improve forecasting the development of shoreline wave climate and sediment dynamics under a scenario of changing coastal ecosystems due to global change.

THE PROJECT RELATES TO THE FOLLOWING PRIORITY TOPICS AND SCIENTIFIC THEMES

Priority Topics:

2 - Assess and predict impact of environmental change on coastal ecosystems

Scientific Themes:

2 - Implications of Global Change for Coastal Ecosystems and Sustainable Development