

PROTECTION SERVICE OF CORAL REEFS AND MANGROVES IN THE COASTAL ZONE OF PUERTO MORELOS, MEXICO

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INTRODUCTION

Social awareness of preserving the future of the environment has led to a worldwide interest on the evaluation of the ecosystem services to protect the coastal zones.

The analysis presented here focuses on the coastal zone of Puerto Morelos, on the Mexican Caribbean (Fig. 1). The area is a Protected Marine Area and an Area of Mangroves with Biological Relevance (CONABIO, 2015). The peaceful natural environment and the beautiful turquoise sea make this a desirable tourist location.

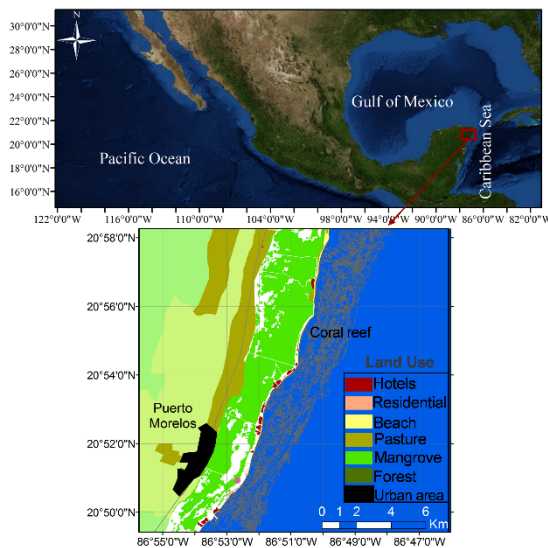


Figure 1 - Location of study area. Land use

The coral reef at Puerto Morelos provides natural protection for the population, tourism infrastructure and mangrove forests at the beach front. The mangrove ecosystem also contributes to the reduction of potential damage from storm surge flooding to the population of the town of Puerto Morelos, which is 2 km inland (Fig. 1).

The aim of this paper is to apply a risk assessment methodology to evaluate the coastal protection services provided by coral reefs and mangroves for flood and erosion risk reduction from coastal hazards in the coastal zone of Puerto Morelos.

METHODOLOGY

Risk will be defined as the combination of the occurrence probability of a coastal hazard and the consequences, in terms of damages or losses. On the one hand, the coastal protection service provided by coral reefs will be considered for erosion

risk reduction on the beach and also for flood risk reduction on the population, tourist infrastructure and mangrove forests located at the beach front. On the other hand, the protection service provided by the mangroves will be evaluated for flood risk reduction from tropical cyclones for the population of the town of Puerto Morelos.

A methodology is proposed here to evaluate the consequences of coastal flood events on mangrove ecosystems, based on the structure of the approach of Dassayanake et al., 2015. The main steps of the methodology are shown in Fig. 2. The methodology incorporates an *ecosystem health* parameter, which varies with the conservation or degradation status of the ecosystem, and also the quantification of the affectation level of threats as a function of the species characteristics (i.e. the possibility of the mangrove species to develop aerial roots as adaptation to sedimentation or erosion threat).

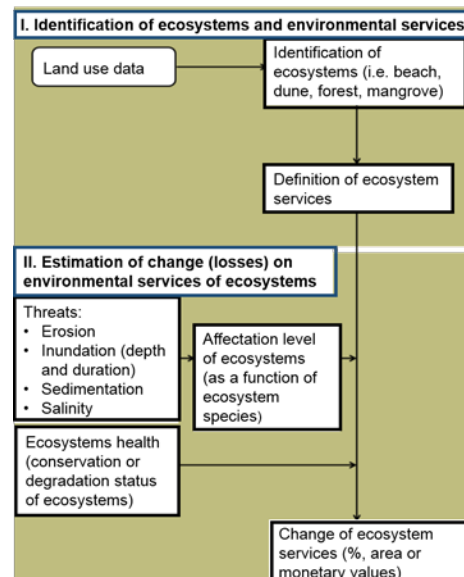


Figure 2 - Methodology for the evaluation of environmental losses of mangroves caused by coastal hazards

REFERENCES

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Dassanayake, Burzel, and Oumeraci (2015): Methods for the evaluation of intangible flood losses and their integration in flood risk analysis, Coastal Engineering, vol. 57, no 01, 1540007.