COASTAL ADAPTATION IN THE DEVELOPING WORLD: A CASE STUDY IN DURBAN SOUTH AFRICA

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INTRODUCTION

Much of the world´s population is living along the coast. Along with rising sea levels and an increase in storminess this poses a global problem. Nicholls et al (2008) estimated that forty million people worldwide are potentially exposed in a 1 in 100 year storm event. Very little research regarding coastal adaptation in Africa has been done.

Durban, with a population of approximately 3.5 million, is situated on the East Coast of South Africa. The city experienced an extreme storm event in March 2007; which caused significant coastal erosion, damage to the coastline and large financial losses (Phelp et al, 2008). A 500 metre section of the central beaches area of Durban, adjoining the city centre, was selected as the case study area for this study. This coastal section contains valuable infrastructure such as the Addington District Hospital.

PROBLEM DESCRIPTION

At present detailed coastal vulnerability and risk assessments are not possible for most cities in Africa due to the large costs involved in such assessments. This study aims to estimate the vulnerability of a section of the developing world coastline using empirical methods. Possible coastal adaptation options are compared according to cost-effectiveness and presented at a conceptual level.

STEP 1: ASSESSING THE VULNERABILITY

The vulnerability of a typical cross section was assessed in terms of the following coastal hazard indicators; dune retreat, runup and overwash. Empirical methods were used to estimate the impact of the 1 in 100 year storm in terms of these indicators for three sea level rise (SLR) scenarios.

An attempt was made to quantify the impact of these coastal processes at the case study location by delineating coastal hazard setback buffers (as shown in Figure 1). The main causes of coastal damage are expected to be beach erosion, coastal flooding and pollution. Storm debris and damage to infrastructure such as the sewage network also have significant impacts.

STEP 2: DEVELOPING CONCEPTUAL DESIGNS

Potential coastal protection designs are discussed in terms of its feasibility for implementation at the case study location. Unsuitable options are eliminated and plausible options compared in more detail in terms of the following evaluation criteria: vulnerability, cost, environmental impacts and the impact upon the recreational and touristic utilization of the area.

Figure 1: Areas potentially affected by erosion and flooding during a 1 in 100 year storm event

CONCLUSIONS AND RECOMMENDATIONS

The vulnerability assessment highlighted that some infrastructure is vulnerable to erosion and flooding during a 1 in 100 year storm event. The vulnerability increases as SLR increases.

Empirical methods derived to estimate coastal hazards (such as dune retreat, runup and overwash) can be useful for determining first estimates of the physical vulnerability of a coastal section in terms of hazards. More research is needed to establish the accuracy of these methods. Developing a generic vulnerability assessment methodology tailored to the developing world could be valuable to local governments. Local vulnerability assessments could also tie in to global climate change studies and greatly increase their accuracy.

REFERENCES

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