BEACH TOURISM AND CLIMATE CHANGE. A SIMPLE INDEX TO ASSESS VULNERABILITY AT LOCAL LEVEL

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Abstract
Beach tourism is the cornerstone of the Spanish tourism industry. Mass tourism has been developed from the 50s through an economic model based on climate and the exploitation of the beaches. The National Climate Change Adaptation Plan (NAP) expects that changes in sea-level will promote erosion and coastal retreat. It is very likely that these physical changes will affect to the tourist destinations attractiveness. This paper analyses the vulnerability of the beach tourism at local level by means a simple index constructed using datasets referred to lodging and beach coverage. It has been tested in the province of Alicante and the results indicate minimum changes in the beaches coverage of 1.03% in 2020 and maximum of 4.26% in 2040.

Keywords: Beach, Global change, Erosion, Mediterranean Sea

The beach as a tourist attraction is a key factor for tourism destinations competitiveness. The beach ecosystem services have included recreational functions which provide benefits and well-being to local communities. Coastal erosion is decreasing the attractiveness of coastal areas leading to natural and economic impacts. The effects of climate change are predicted to have dramatic consequences, particularly when coastlines are retreating inland in response to rising sea levels [1]. The most likely scenario is the loss of considerable coastal areas and the reduction of the beach coverage [2]. Nevertheless the tourism literature has been overlooked the climate change, probably explained by the complexity of expected tourism demand reactions [3]. There has been little examination of the impact of climate on the success of tourism destinations [4] and the importance of physical changes in the beach ecosystem services [5] [6]. The competitiveness models of tourism destinations usually consider natural resources but a large scale and transfer environment-attractiveness relationship it is difficult from national to local level.

This paper analyses the vulnerability of the beach tourism at local level towards climate change by means an index approach. Their construction is simple and affordable, and the results of the index calculations are understandable. The datasets used are referred to the physical conditions of the beach and lodging in the coastal municipalities. The beach coverage and the changes projected are available through the project C3E included in the NAP. This project subdivides the coastline into squares (units) and provides information about length/area of the beaches and the response of the shoreline to sea-level rise. The time frame chosen is four-fold and thus represents the current scenario and a hypothetical situation projected in 2020, 2030 and 2040. The lodging data is published by the regional statistics services every year (considering 2014 database in any scenario). The index has set as follows: $I_t=(A-R_tL)/B$ where A is the beach coverage at a particular scenario (m); L is the beach length (m); R is the coastal retreat estimated at a particular scenario (m); and B is the bed places in coastal municipalities.

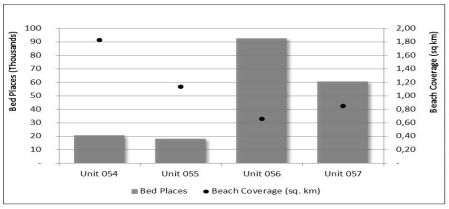

Fig. 1. Beach coverage and bed places distributed in squares (units).

The index has been tested in the province of Alicante, one of main beach tourism destinations in Spain. The length of the beaches is 78 km and supposes 33% of province shoreline. The capacity of the tourist accommodation sector in coastal municipalities is estimated in 191,784 bed places. The province is subdivided in four squares (units 54 to 57). The units 56-57 have 37.5% of total length beaches, 33.6% of total beaches coverage and 80% of total bed places. Both units incorporate important tourist destinations as Benidorm, Calpe, Jávea or Dénia. The index estimates 7.01 and 13.86 m^2/bed for unit 56 and 57 in the current scenario respectively. The result for unit 54 is 89.3 m^2/bed and 62.5 for unit 55. We appreciate that situation between 54-55 and 56-57 units is unevenly balanced. Nevertheless the coastal retreat is worse in first than last units. The percent of beach coverage affected would have from 1.03 up to 1.19%. In 2030 would have from 2.35 up to 2.71%. More than 3 point increase is estimate in 2040 going from 3.72 to 4.26%. The variation of area per bed place would have from 0.29 up to 3.32 m^2 in absolute terms if we compare current and 2040 scenarios. While the 56-57 units decrease 0.29 and 0.60 m^2, 54-55 units do 3.32 and 2.46 m^2 respectively. These consequences on beach coverage should be on the agenda of tourism industry and the integrated coastal management.

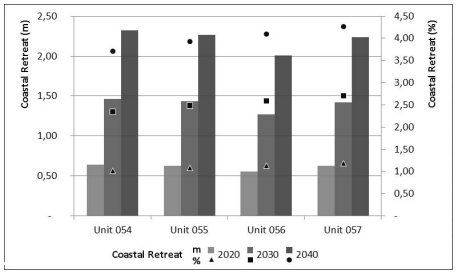

Fig. 2. Coastal retreat estimated by squares (units).

References
1 - Schlacher T.A., Schoeman D.S., Dugan J., Lastra M., Jones A., Scapini F. and McLachlan A., 2008. Sandy beach ecosystems: key features, sampling issues, management challenges and climate change impacts. *Marine Ecology*, 19: 70-91.

2 - Losada, I., Izaguirre, C. and Diaz, P., 2014. *Cambio climático en la costa española*. Oficina Española de Cambio Climático, Ministerio de Agricultura, Alimentación y Medio Ambiente. 133 pp.

3 - Roselló-Nadal, J., 2014. How to evaluate the effects of climate change on tourism. *Tourism Management*, 42: 334-340.

4 - Day, J., Chin, N., Sydnor, S. and Cherkauer, K., 2013. Weather, climate, and tourism performance: A quantitative analysis. *Tourism Management Perspectives*, 5: 51–56.

5 - Sardá, R., 2013. Ecosystem services in the Mediterranean Sea: the need for a economic and business oriented approach. *In*: Hughes, T. (ed.) Mediterranean Sea: Ecosystems, Economic Importance and Environmental Threats, Nova Publishers, pp.1-33.

6 - Perch-Nielsen, S.L, 2011. The vulnerability of beach tourism to climate change – an index approach. *Climatic Change*, 100: 579-606.