

Nonlinear tourist flows in Barcelona

Enric Trullols, Imma Massana, Joana d'arc Prat, Gerard Olivar

Abstract: Tourism is not only a source of wealth, but also a positive way of knowing and mixing local and foreign cultures. However, overexploitation of natural resources and inadequate behaviors (among other factors) can lead to a conflict between tourists and locals that makes the tourist economy not sustainable. The modeling of tourist flows is a good tool to face and overcome this problem, looking for the balance between natural and socioeconomic resources, the interests and rights of tourists and locals. This paper proposes a mathematical model of nonlinear differential equations, which allows to study the dynamic interaction between the main factors that affect the tourist flows of Barcelona. We have used nonlinear EDOs to represent the interactions between residents, tourists and investors. Political/economic decisions and geopolitical factors have been added as external forces. Specific aspects of Barcelona have been taken into account, such as the impossibility of extending the city, the lack of regulation (and excessive regulation), the affluence of investors and the increase in prices (which pressures residents outside from the city). Our results show that sustainability, that is, the positive values of the population of tourists, locals and investors, in the long run is possible under the appropriate economic and social decisions.

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- 1) Enric Trullols, Professor: Universitat Politecnica de Catalunya, Jordi Girona, 31; 08034 Barcelona, Spain (ES), enric.trullols@upc.edu, the author presented this contribution at the conference in the special session "MegaCities: Nonlinear dynamics and networks" organized by G. Olivar.
 - 2) Imma Massana, Professor: Universitat Politecnica de Catalunya, Jordi Girona, 31; 08034 Barcelona, Spain (ES), immaculada.massana@upc.edu.
 - 3) Joana d'arc Prat, Professor: Universitat Politecnica de Catalunya, Jordi Girona, 31; 08034 Barcelona, Spain (ES), joana.darc.prat@upc.edu.
 - 4) Gerard Olivar, Professor: Universidad Nacional de Colombia, Carrera 27 # 64-60 Manizales, Caldas, Colombia (CO), golivart@unal.edu.co.