A holistic evaluation of risks in coastal regions under changing climatic, environmental and socioeconomic conditions: the Theseus Decision Support System.

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There is a general acceptance that global changes associated with natural hazards and socioeconomic processes are occurring at a faster pace than ever, with deep implications in terms of risk exposure and environmental impact. The capacity of coastal areas to adapt and react to these changes will be a key factor in the future preservation of life standards and represents a great challenge for politicians, scientists and professionals at any level. Within the large scope of Theseus Project (EU 7th Framework Program), one of the main objectives is to design a tool to help decision makers in defining optimal strategies to minimize risks within a certain city or coastal area in a three-fold sense: economic losses, human damages and environmental impacts. The resulting software, the Theseus-DSS, links the most relevant physical processes (waves, sea-levels, hard and soft structures, coastal erosion and inland flooding) with the potential impact zones (marine and inland), considering their functions (ecosystems) and uses (economic units), and the dependence of this functions and uses upon the prevailing physical conditions. The new software tries to fill a gap among the existing tools, based on the following pillars:

• Seamless integration of disciplines: physics, engineering, ecology, social sciences and economy.

• Intermediate spatial scales (1- 10 km) and medium-to- long time spans (1-10 years).

• Decision-making based on a balance between deterministic models and expert, discussion-based assumptions.

The user of the Theseus-DSS will be able either to check the consequences of predefined scenarios at a particular study site, or to create user-defined scenarios, run them and compare the results with other scenarios. The results are expressed, locally and at an aggregate level, in the three aforementioned dimensions: economic losses (€year), mean annual expected live losses (persons/year) and impact on habitats (null, low, medium and high).