

Present and future of desertification in Spain: Implementation of a surveillance system to prevent land degradation

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Mitigation strategies are crucial for desertification given that once degradation starts, other solutions are extremely expensive or unworkable. Prevention is key to handle this problem and solutions should be based on spotting and deactivating the stressors of the system. Following this topic, the Spanish Plan of Action to Combat Desertification (SPACD) created the basis for implementing two innovative approaches to evaluate the threat of land degradation in the country. This paper presents tools for preventing desertification in the form of a geomatic approach to enable the periodic assessments of the status and trends of land condition. Also System Dynamics modelling has been used to integrate bio-physical and socio-economic aspects of desertification to explain and analyse degradation in the main hot spots detected in Spain. The 2dRUE procedure was implemented to map the land-condition status by comparing potential land productivity according to water availability, the limiting factor in arid lands, with plant-biomass data. This assessment showed that 20% of the territory is degraded and an additional 1% is actively degrading. System Dynamics modelling was applied to study the five desertification landscapes identified by the SPACD. The risk analysis, implemented on these models, concluded that 'Herbaceous crops affected by soil erosion' is the landscape most at risk, while the Plackett-Burman sensitivity analysis used to rank the factors highlighted the supremacy of climatic factors above socioeconomic drivers. © 2016 Elsevier B.V.

2dRUE procedure

Desertification

Early warning system

Risk analysis

System Dynamics modelling

Climate change

Climatology

Plants (botany)

Risk analysis

Sensitivity analysis

System theory

2dRUE procedure

Desertification

Early Warning System

Innovative approaches

Land productivities

Socioeconomic aspects

Surveillance systems

System dynamics modelling

Risk assessment

desertification

land degradation

mitigation

risk assessment

sediment transport

socioeconomic status

surveillance and enforcement

Spain