Geophysical Research Abstracts,
Vol. 11, EGU2009-11414-1, 2009
EGU General Assembly 2009

On the physical- and socioeconomic aspects of land degradation in the Guadalentin basin (SE-Spain): Towards comprehensive understanding for effective remediation

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During the last two decades, the Guadalentin basin in south-eastern Spain has been the study area for many national- and international studies dealing with land degradation and desertification. One of the reasons for such a broad interest in the Guadalentin basin is that land degradation is generally considered severe in large parts of the basin due to a combination of the Mediterranean climate characterised by dry summers followed by intense autumn rainfall, steep topography that marks most parts of the landscape, and fragile soils on erodible lithologies. The main types of degradation are due to soil erosion, soil surface crusting, aridity, soil organic matter decline and salinisation. Moreover, triggered by various political and socioeconomic drivers, important land use and management changes have taken place over the last centuries, which have formed an important driver for further land degradation. Examples of such changes are large-scale land abandonment, a shift from dryland cereals production to large almond plantations, large scale land levelling for irrigated horticulture and urban expansions, and several types of agricultural subsidies. Numerous publications have been produced based on works done to address land degradation in the Guadalentin. However, until now there is no concise and integrated overview of what has been done and what is still missing regarding the study of the physical- and socioeconomic aspects of land degradation and conservation. This is in fact crucial to assist policy makers in making decisions that would effectively navigate land management in the area to a sustainable way. Here, we aim to provide such an overview by listing and discussing the main studies performed in this area, and by providing an integrated synthesis of the main physical- and socioeconomic factors identified in these studies as being responsible for land degradation, with a focus on feasible soil conservation strategies. In overall, there has been a strong emphasis on the study of biophysical characteristics related to climate, vegetation, soil, flooding, hydrology, and on the socioeconomic and political drivers of land degradation. The latter especially focussed on the effects of agricultural subsidies on land use changes and land degradation. Most studies have concentrated on the headwaters of the Guadalentin and on areas with (semi-) natural vegetation. However, several critical issues remain under-researched including but not limited to: 1) costs of land degradation (on-site and off-site), 2) effects of different conservation strategies on the short- and long-term, on-site and off-site, 3) the effect of large-scale land conversion by land levelling and urban expansion, and 4) the future implications of land managers' decisions on land degradation.