



## **Pattern Water Use Efficiency perspective on degradation and recovery of shrublands across Mediterranean to Arid transition zones**

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Shrublands cover a total of 12.7 million km<sup>2</sup>, a considerable part of them along semi-arid to arid transition zones. Varying patterns of shrubs, grasses and barren land along such climatic gradients express the spatial dimension of climate change and human disturbance which attracted limited attention in the eco-geomorphic literature. Questions concerning relationships between rainfall, shrublands biomass and their patterns are fundamental for the understanding of these ecosystems response to the expected changes in water availability due to global warming and the increase in human disturbance to natural ecosystems following World population growth. While processes leading to the formation of patterns had attracted considerable attention, the spatial dimension of Water Use Efficiency (WUE) which is a parameter measuring ecosystems productivity in relation to water availability is severely missing. Relative shrub cover is a primary estimator of the fraction of water utilized for shrubs growth. Edge effects must be considered as well in fragmented ecosystems in general and in hot regions in particular since soil temperature in hot regions which frequently exceed 50°C during summer months decreases photosynthesis and productivity in plants bordering bare soil. This edge effect is decreasing with the increase in shrubs' height. Pattern Water Use Efficiency describes the combined effect of shrub cover, shrub height and shrub patches edge zone proportion on water use efficiency. In my presentation I will first present mapping of PWUEs across Mediterranean to arid transition zones in the Eastern Mediterranean. Then I will present several mathematical models describing PWUE for simulated patterns, searching for the spatial parameterization providing the highest sensitivity to patterns responses to changes in habitat conditions. Such simulations would allow us to discuss several PWUE strategies for shrublands recovery under the current scenarios of climate change and human driven degradation.