Vulnerability- and Degradation Analysis of semiarid Island ecosystem in the marginal tropics on the example of Fogo (Cape Verde Islands) - a study based on Remote Sensing and GIS

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Due to the high variability of precipitation the Sahel region has a high natural potential vulnerability. In addition the region is characterized by a high population growth which boosts processes of land degradation and desertification. Island ecosystems in the semiarid regions of the marginal tropics as Cape Verde are particularly affected by these processes. The Island of Fogo (Cape Verde) is, with the Pico de Fogo (2.829 m) and its small scaled climatic, floristic and geo-ecological differentiation an optimal research space for such an island ecosystem. Like in other parts of the Sahel region, the archipelago of Cape Verde has an overall decrease in precipitation of 15-30 percent since the 1970's. These effects are joined with the risk of erosion, degra-dation and finally desertification, which is boosted by the population growth initiated intensification of the agricultural land use and a growing tourism.

By the use of multitemporal and multiscale airborne and satellite data, these above-named processes should be exemplarily analyzed and modelled on the island of Fogo, with the aim to evaluate the ecological vulnerability in relation to the global cli-matic changes and locally initiated processes of land use changes and land degrada-tion.

Against the background of this situation a high resolution object orientated land use and land cover classification for the island of Fogo should be generated by using current fusioned QuickBird data, to detect all parts of the heterogeneous land cover seg-

ments and degradation phenomena's. Additionally, this classification is an impor-tant part a planned change detection analysis over the last three decades. Beyond these detections a geo-ecological spatial pattern analysis should be gener-ated to show different types of the local ecosystem, on the base of the land use and land cover classification and geo-ecological factors like precipitation, soil, exposition, slope, elevation and so one.

In this context, ground based analysis of soil, crop, kind and concentration of vegetation, erosion- and degradation appearances will be carried out in detected test areas. For defining these areas a "Top-Down Approach" will be used, which includes a map of the geology of Fogo (1 : 100.000), a soil map from the 1970s (1 : 100.000), a digital elevation model, two topographic maps (1 : 25.000, 1 : 60.000) and a map of the agriculture ecology and vegetation from the 1980s (1 : 50.000). All these different layers are already combined in a Geo Ecological Information System (GECIS) of the island Fogo. With the aid of high resolution remote sensing data, different stages of degradation should be detected in these test areas.

All the generated information's should be combined for the modelling of Vulnerability Index for these test areas, supported by socio-economical studies of the population development and structure, tourism growth and agricultural structures, because these are also important influencing variables for the ecological vulnerability.

In a "Bottom-Up Approach" this Index will be extrapolated to the whole area of Fogo and could be a base for sustainable land use planning and the redevelopment of agricultural strategies.