

MAPPING OF WELWITSCHIA MIRABILIS WITH HIGH RESOLUTION SATELLITE IMAGERY IN THE NAMIB DESERT

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1. ABSTRACT

Along the Atlantic coast of Namibia and southern Angola stretches the second largest desert of Africa, the Namib Desert. Indigenous to this fragile ecosystem, where fog is the main and limited source of moisture grows one of the oldest existent plants called *Welwitschia mirabilis*. Widely scattered in the desert, often concentrated in greater number in dry streambeds, some of the plants reach an age of almost 2000 years. Many habitats of *Welwitschia* populations have been described in literature, whereas area-wide mapping and even more monitoring projects of individual specimens rarely took place. An in situ assessment of individuals is highly restricted by inaccessible habitats and by the fragile desert surface, easily scarred by cars or uncaring walkers. Earth observation images and Remote Sensing techniques meet the demands for a damage-free mapping and monitoring of such endangered plant species.

This study is about a non-invasive mapping technique of *Welwitschia* in its habitat based on spatially high resolved satellite images. The site investigated is located in the Namib-Naukluft Park near to the coastal city of Swakopmund. In this habitat, *Welwitschia* individuals are growing on a sandy, uniform matrix, associated with bushes and few dry grasses. First, two satellite data sets from Ikonos and Quickbird satellite are geometrically corrected, including GPS ground control points and a digital elevation model. Second, *Welwitschia* individuals, bushes, sandy and rocky surroundings are successfully mapped with a supervised and object-oriented classification approach. GPS points, training samples and verification objects have been collected previously in a field survey. 49 of 55 (89%) *Welwitschia* individuals known in ground reference, were classified successfully in both data sets, despite the limited spectral and spatial resolution. Third, the classification results are compared to a pixelbased classification of *Welwitschia* with Ikonos data also published on this conference [R. Kellenberger et al.: *Spectral characterisation and mapping of Welwitschia mirabilis in Namibia*]. In comparison it was shown, that the object-oriented approach improves the mapping precision of *Welwitschia* species substantial. The presented area wide mapping technique from space is effective and non-invasive. It has the potential to contribute crucially to the protection and monitoring of *Welwitschia mirabilis* and is adaptable to further endangered plant individuals in a desert environment.