Biodiversity mapping: towards an Atlas of Cactaceae Diversity and distribution patterns

Kirsten Hahne, Anke Stein, Jens Mutke, Pierre L. Ibisch & Wilhelm Barthlott
Nees-Institute for Biodiversity of Plants, University of Bonn

For the conservation and further study of cacti, the knowledge of their distribution is essential. For the first time, we present maps and analyses of the spatial diversity patterns for the complete family of the Cactaceae. The aim was to generate an Atlas of Distribution Patterns for all 1433 species. Based on three decades of distribution mapping for Cacti in the group of Wilhelm Barthlott, the current analyses were finalized in two diploma theses of Anke Stein and Kirsten Hahne in 2008/2009.

We established a high-resolution GIS dataset and corresponding database consisting of >45,000 data records with distribution data of cacti. As sources we used geographical works like floras and checklists and taxonomical works such as monographs and lexica. These data were complemented with electronically available herbarium data and published range maps. We generated diversity maps for all genera, tribes, subfamilies, and the complete family. In addition to species richness, genus richness patterns, patterns of endemic species, and the range size distribution are analysed.

The main centre of highest species richness is located in Central Mexico, but the Eastern Andes in Bolivia and Argentina and south-eastern Brazil are also important centres. The main centre of generic richness is also Mexico, but Bolivia/northern Argentina/Paraguay, south-eastern Brazil, the Caribbean region and Peru show high generic richness, as well.

The analysis of range sizes showed that only two species have range sizes of more than 10 million km^2 (*Rhipsalis baccifera* and *Epiphyllum phyllanthus*). According to our data, 750 species (~50% of all Cactaceae) have range sizes <100,000 km^2 and 106 species (7%) are highly endemic with range sizes <10,000 km^2.

An important achievement of this study is that all data are available in an electronic database and GIS format. The next steps will be to publish the complete Atlas of Cactaceae diversity and distribution patterns and to analyse the information in terms of phytogeographical, macroecological, and conservation aspects.

We would like to thank the BIOMAPS project team for technical support and David Hunt for fruitful discussions and for access to data from the New Cactus Lexicon in electronic format. The project has partly been funded by the Academy of Sciences and Literature Mainz (“Biodiversity in Change” Program) and the Deutsche Kakteengesellschaft.