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## Review

*Ib Friis, Paulo van Breugel, Odile Weber, Sebsebe Demissew*

### **The Western Woodlands of Ethiopia. A study of the woody vegetation and flora between the Ethiopian Highlands and the lowlands of the Nile Valley in the Sudan and South Sudan**

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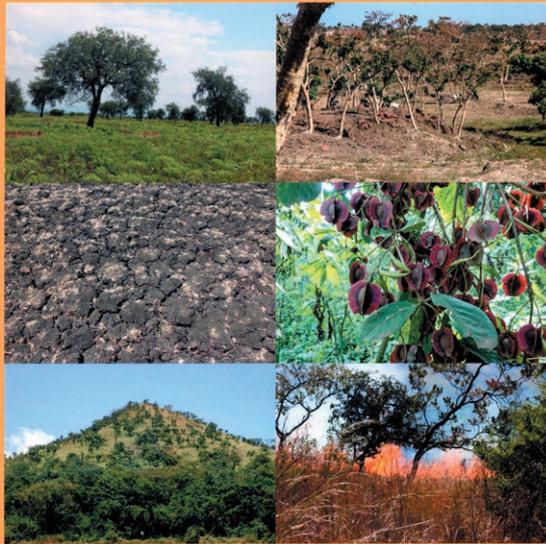
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Since the start of the Ethiopian Flora project in the 1980s, the study of the flora and vegetation on the Horn of Africa has resulted in many, much-needed publications, considering the importance of the Horn as one of the significant biodiversity hot spots in the world. With this great publication, Ib Friis and his collaborators have given us the first monograph on the woodlands of western Ethiopia. The bulky text of this new book is complex, but well-articulated, beginning with information on topography, geology and climate, mostly focused on the western slopes of the Ethiopian highlands, but where suitable also providing a wider African framework. The western escarpment of Ethiopia has important run-off of water to the Nile, particularly through the Blue Nile but also through 10 or more other rivers running to the Nile. The new Ethiopian GERD reservoir will cover significant areas studied for this book. Some aspects of the ethno-demographic situation of western Ethiopia are also addressed, pointing out the ethnic diversity and the considerable variation in the population density of the area. Previous studies, especially Italian studies in the 1930s, the phytogeographic syntheses of Pichi Sermolli (1957), and British studies on the Sudan border, all summarized by White (1983), form the basis for subsequent investigations and more recent studies utilizing computer analyses, but until now based on too little information.

It is not the first time the lead author and his co-authors have formed an inclusive vision of Ethiopian flora and vegetation, partly based on observations made during the many years, when Ib Friis and Sebsebe Demissew worked together on the Ethiopian Flora project. A first result was a more general work by Ib Friis, Sebsebe Demissew and Paulo van Breugel, "Atlas of the potential vegetation of Ethiopia" Royal Danish Academy of Sciences and Letters. Biologiske Skrifter 58 (2010), which has given inspiration to research in the present work. Also inspiring was a study by the same group, that time led by Paulo van Breugel, which investigated dry-season grass fires; that

## The Western Woodlands of Ethiopia

by Ib Friis, Paulo van Breugel, Odile Weber and Sebsebe Demissew



A study of the woody vegetation and flora between the Ethiopian Highlands and the lowlands of the Nile Valley in the Sudan and South Sudan

Det Kongelige Danske Videnskabernes Selskab

study showed that the distribution of grass fires in western Ethiopia almost completely agrees with the western woodland vegetation.

The two largest parts of the new volume are made up of descriptions of the vegetation of 16 profiles from the highlands to the lowlands along the entire western escarpment of Ethiopia from the border with Eritrea in the north to the border with Kenya in the south, and an accurate atlas of the distribution in the whole of Ethiopia of 169 woody species that have been observed in the western woodlands. The profiles of the various vegetation types are commented on in detail and are accompanied by nearly 100 excellent original colour photographs, showing the varying physiognomy of the western woodlands. The atlas-chapter includes distribution maps of 169 woody species, based on their occurrence in the 151 relevés studied and on information derived from herbarium specimens in Addis Ababa, Kew, Firenze and elsewhere.

In two following chapters it is attempted to divide the western woodlands into phytocoria and to analyse the distribution of various adaptations to environment. Both chapters conclude that neither the phytogeographical differentiation, nor the adaptations to the environ-

ment show clearly marked patterns. Geographical variation in the ecological adaptation of the woody species is limited, and there are no sharp discontinuities in species diversity. Also the floristic richness shows limited variation (but the richest flora is along the Blue Nile). Particular interesting is a following chapter dedicated to analyses of twelve indicator species of the western woodlands, the distributions of which are here seen in both an African and an Ethiopian context, accompanied by a clearly coloured cartography. It is shown that almost all species reach from western Ethiopia to the Atlantic Ocean, but usually with the widest north-south distribution in western Ethiopia.

The environmental parameters and floristic contents of the 151 relevés have been analysed with clustering methods and ordinations, the work of Paulo van Breugel, in attempts to discover plant associations and relation between species distributions and environmental parameters. This is not an easy task; the clustering analyses generate a large number of small and rather similar clusters but most of the small clusters of the western Ethiopia escarpment can be combined into two weakly defined plant associations, the *Anogeisus leiocarpa-Pterocarpus lucens-Acacia hecatophylla-Sterculia africana* and the *Combretum collinum-Bridelia scleroneura-Terminalia schimperiana-Annona senegalensis* woodlands. Many environmental factors are found to explain parts of the variation from relevé to relevé; the most important are latitude, altitude, climate and soil types, while slope, fire frequency and other parameters seem to be less important.

The concluding chapter attempts to answer central research questions of the book, partly derived from the group's 2010-publication on the vegetation of Ethiopia. Should the western woodlands be subdivided? As appears from the above, the western woodland form a rather homogenous entity or at least an entity with continuous variation. Was the delimitation of the western woodland in the 2010-publication correct? Yes, except for a few modifications in the south. Further research questions relate to conservation of the woodland formations and the species. The general idea behind the work is clearly to report on status quo, showing how our knowledge of the area has improved over time, but also to provide solid information about the current vegetation for use in the future. Perhaps the most valuable general result of the work is the surprising floristic and ecological uniformity or continuity from lowest to highest altitudes and from northern limit (Eritrean border) to southern limit (Kenyan border), a distance of nearly 1200 km and almost 10° latitude. The book concludes with a number of appendices documenting the observa-

tions. Of particular use for future studies are the lists of species seen in the 151 investigated relevés.

All observations are here presented with a precise scientific rigor not always found in tropical botanical literature. The work is a trustworthy contribution to the understanding of the ecological and environmental uniqueness of this area, hopefully supporting its preservation and the general respect of it as a unique asset of Mankind. The mapping and analyses are made with modern, but well tested methods (including DIVA-GIS, ArcMap, Q-GIS, UPGMA, and various ordination methods). This book will undoubtedly be a landmark in the knowledge of that vast western part of Ethiopia, which until now has been so little studied and so scarcely documented in the literature.

Finally, a strong note of approval should also go to the appearance of the book, the excellent level of editing, the clear and elegant lay-out and the general production of all texts, maps and photographic work.

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