



Quantifying the success of improved forest management from dendrochronology: examples from North Ethiopia

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The increasing environmental and human pressure on the vulnerable environment of the North Ethiopian highlands requires sustainable management to avoid further land degradation. High altitude forests play a key role in this environmental balance and are very important for local livelihoods. They function as a hygric buffer by capturing and storing rainfall, which reduces soil erosion and protects against flooding, landslides and rock fall. The hygric buffer effect of mountain forests also provides water for downstream sources and for agriculture in the surrounding lowlands. Improved understanding of the growing patterns, ring formation and forest structure of this afro-alpine high altitude *Erica arborea* L. forests is essential to improve sustainable forest management practices. This paper studies two mountain forests in the North Ethiopian Highlands under contrasting management conditions; Lib Amba of the Abune Yosef Mt. range (12°04'N, 39°22'E, 3993 m a.s.l.) which is completely protected since five years and Mt. Ferrah Amba (12°52'N, 39°30'E, 3939 m a.s.l.) which is still strongly influenced by anthropo-zoogenic impacts. Dendrochronological results from cambial marked stem discs show complex but annual growth ring formations that reflect these differences in anthropo-zoogenic pressure; Tree-ring width is significantly wider in Mt. Lib Amba. Improved insight in the growing pattern of *Erica arborea* L. forests is also given by monitoring of tree growth and seedling recruitment in experimental plots since 2012 and by studying the relation between tree growth and the geomorphology and soil thickness. Seedling recruitment and vegetation indices indicate that tree growth is significantly better in the protected forest of Lib Amba. One of the key elements for sustainable land management is the creation of forests at critical locations. Insight in the response of tree growth to different types of land management and different morphological conditions can help to identify these critical locations. But most importantly, dendrochronological results have proven to be a valuable tool for objective validation of the success of land management strategies on a short term.