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Heterogeneity of net precipitation due to tree species and edge effect in a semi arid cloud forest in Dhofar, Oman

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The cloud forests of the Dhofar mountains in Oman are one of few water limited seasonal cloud forests in the world. Because of the dry conditions (annual rainfall is only 114-252 mm depending on the location), cloud water interception by tree canopies (horizontal precipitation) is believed to play a major role for survival of the forest. Being the only green belt in the region, these ecosystems are under considerable pressure from animal feeding on tree canopies. In order to protect the Dhofar cloud forest from overgrazing and degradation a number of fenced forest enclosures have been established. Many of the originally established enclosures, however, did not survive and degraded similar to the enclosure surroundings.

Our research focuses on the distribution of net precipitation (total water received below the tree canopies), as a function of throughfall, stemflow, and, horizontal precipitation within one of the few successful forest enclosures at Tawi Attair. Based on intensive measurements of throughfall, stemflow, fog, and rainfall water our work shows that the heterogeneity of net precipitation is linked to tree species and tree positioning within the enclosure. We demonstrate the contribution of both stemflow and throughfall for two different tree species, Pithicellobium dulce and Leucaenia leucacephala, as well as for different sectors within the enclosure. For stemflow results show significantly higher amounts for trees situated at the enclosure fence as well as significant differences between the two tree species. For throughfall the results were less pronounced but still show significant differences between different sectors. Generally, stemflow was considerable in all sectors, and is believed to contribute significantly to ground water recharge in this region.

The work contributes to the understanding of these water limited seasonal cloud forests and to the future design of successful forest enclosures in the Dhofar mountains.