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Consequences of Alpine Vegetation Change for Water Resources

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In alpine areas, tree lines have been observed to shift and are expected to shift further due to climate warming. Thus, the area occupied by vegetation is expanding and potentially modifying the influence of evapotranspiration (ET) within alpine water balances. Secondly, the absolute rates of evapotranspiration are expected to increase in alpine areas due to the warmer climate, specifically feedbacks between warming air, changes in vapour pressure deficit and moisture transport processes. In addition, feedbacks also exist between the change in area of forest cover and change in rate of ET, which include processes related to the change in roughness and change in albedo. Such changes will affect the entire water balance including run-off and groundwater recharge. Predicting feedbacks between changes in vegetation and climate is challenging due to the complexity of the hydro-ecological processes. In this presentation, we will review the state of current knowledge regarding these interrelated phenomena in the context of the water budget and discuss how we will answer open questions in our study catchment in the Swiss Alps (Vallon de Nant, Vaud).