Abstract:

Sensitivity and Response of the Treeline Ecotone in Rolwaling Himal, Nepal, to Climate Warming (TREELINE)

At a global scale, low-temperature growth limitation determines the position of natural alpine treelines. At landscape and local scales, however, treeline position, form (spatial pattern), and dynamics depend on multiple interactions of influencing factors and mechanisms. Climate warming is expected to induce treelines to advance to higher elevations. Empirical studies, however, give evidence of both advancing alpine treelines and rather insignificant responses. This inconsistency of findings is not well understood, thus pointing to considerable research deficits.

Integrating field sampling/mapping, experimental treatments, remote sensing, geostatistics, GIS applications, and GIS-integrated modelling, the project aims at investigating the sensitivity and response of the treeline ecotone in Rolwaling Himal, Nepal, to climate warming using a landscape approach. Treeline response will be analysed focusing on spatially differentiated patterns and processes. Correlating varied responses to landscape- and local-scale site conditions and mechanisms (geomorphic controls, soil physical and chemical conditions, plant interactions associated with facilitation, competition, feedback systems) will then allow inferences on how the region-wide climate warming input and finer-scale modulators interact to govern non-uniform treeline response patterns. Building on that, scenarios of treeline dynamics under climate warming will be developed.