A review of the suitability of macadamia for growth in Nepal: spatial probability models using climatic scenarios, socio-economic context and land-use

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Macadamia were first cultivated in Nepal in the 1970s and, apart from a few individual growers', the trees have been neglected since. Only in recent years, has the interest in the trees reawakened and young trees have been readily planted in many different districts of Nepal.
Global climate models predict changes in temperature and precipitation that will shift regional climate zones. Understanding the influence of these changes on local climates and the suitability of specific sites to produce individual crop types, at present and in future, is essential to increasing local crop resilience and to ensuring the long-term viability of plantations. This is true especially for high-value, perennial tree crops such as macadamia that require significant investment. In the context of climate change, we strive to understand how existing land-use and forest zones are influenced and what it takes for farmers to adjust their livelihood practices and adopt cash crops such as macadamia.
Based on a literature review of the macro- and microclimatic requirements, the current and future suitability of Nepal for Macadamia production was investigated by means of a spatial model based on extensive in-situ measurements, meteorological data, and climatic layers from the WorldClim dataset. In addition, we have investigated the impact of climate change on existing land-use and forest zones in one chosen district of Nepal using macadamia as an example. Moreover, through in-depth household surveys that divided farmers into those who cultivate macadamia and those who do not, we analysed the socio-economic and cultural characteristics of each category using statistical tests and a multiple logistic regression.
This review shows, that the climatic suitability for macadamia cultivation in Nepal exists under present and future climatic scenarios, but that change to the geography of the zones is to be expected as they shift in elevation. In addition, micro-climatic factors have yet to be studied. Results adjusted to show the land-use and forestry zones indicate that the growing zone of optimal suitability is expected to expand to cover over multiple land-use zones including agricultural, forest and shrub areas. As the increase is most pronounced in the forest zones, we therefore recommend that this be accounted for in policy planning. Finally, macadamias are an accepted cash crop primarily grown by wealthier farmers. To enable women and poorer farmer to benefit from this crop, alternative business models and new policies need to be explored and developed.