Transdisciplinary assessment of social-ecological vulnerability to Climate Change in Southwest Madagascar

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Climate models have shown that there will be an increasing susceptibility to drought in the future for semi-arid regions. However, the impact of these droughts depends on the sensitivity of landscapes and the adaptive capacity of communities. Using a vulnerability framework, and a mixed-methods approach, this paper assesses the vulnerability of the social-ecological systems along a rainfall gradient transect in southwest (SW) Madagascar at multiple timescales. We used a transdisciplinary approach, that combines synthesized regional climate records to assess the exposure to drought, and fossil pollen data from four sites ranging from wetter to drier areas to assess the sensitivity of landscapes over the last 2000 years. Local ecological knowledge (LEK) from household surveys from the driest sites in the Plateau Mahafaly was then conducted to infer adaptive capacity of local communities. Results show that over time, changes in climate linked to drought increase the vulnerability of the social ecological systems in Southwestern Madagascar particularly to the communities’ livelihoods in the driest regions, where there were fewer adaptation options, their need to migrate, and also on biodiversity. Although some coping and adaptation strategies including migration are in place for the communities, these might create feedback loop leading to further degradation and impacts on biodiversity and its conservation, especially in the driest regions where degradation is most likely to occur due to lower adaptive capacity.