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Title: How disturbing: The effects of anthropogenic disturbance on soil health, productivity, and plant community makeup in tropical and subtropical systems

Early humans started farming about 6000 ya, which many consider the start of the Anthropocene, a new era defined by human influence on natural systems. Today, the climate is changing faster than ever, yet we still need to feed the growing population and conserve land to coexist with other species. Is there an achievable balance between both of these objectives? Here, we applied the community ecology concept of the intermediate disturbance, which hypothesizes that moderate disturbance levels can increase species richness and soil health. In this study, we created an anthropogenic disturbance index (0-100) by compositing multiple disturbance indicator ratings (e.g., land use history, tillage intensity, vegetation removal, etc) measured across a range of land uses in the Kula region of Maui, Hawai‘i. We then evaluated the relationship between anthropogenic disturbance on soil health, measured using the Hawai’i Soil Health Index (ranging from 0-1), across the different land uses. We found that disturbance levels and soil health varied, with disturbance index scores ranging from 0 to 72 while soil health scores ranged from 0.02 to 0.88. Our findings do not fully support our intermediate disturbance hypothesis given that health scores decreased dramatically after a certain level of disturbance was reached, which was all associated with annual croplands. Overall, we found that disturbance levels were

dependent on the land use types (shrubland, high-elevation pastures, low-elevation pastures, and croplands) in our study ($p<0.001$)--with croplands having the highest level of disturbance; shrublands, the lowest; and no statistical difference between the two pasture types. Better understanding of the impact of specific disturbance indicators might help us determine what actions separate this intensive land use from others and better understand the implications of disturbances made through our management and conservation efforts on soil health. This will help us identify management practices that may establish resiliency, safeguard the soil and plants we work with from the effects of climate change, and provide ecosystem services such as nutrient cycling and carbon sequestration.