Title: Appendix C: Cultivation can increase harvesting pressure on overexploited plant populations.

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Running Head: Appendix C: Cultivation can increase harvesting pressure on overexploited plant populations

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C Sensitivity Analysis

To test the model sensitivity to the intrinsic rate of increase (λ) we simulate a range of λ values based on Endress et al. (2006). This study suggests a λ of 1.14 ($\pm$ 0.057), in the absence of harvesting. We test five values within the 95% confidence intervals of the mean estimate (Figure C1a). Under default harvesting level and at $\lambda = 1.15$, the population reaches equilibrium at $\approx$ 55% of carrying capacity. Figure C1b illustrates the livelihood choices of individuals under different scenarios of λ rate. The number of people cultivating does not change with different rates of population growth but the number of people wild harvesting increases with higher population growth rate. Overall, livelihood choices do not appear to be very sensitive to changes in λ. Under all λ values tested the majority of people find alternative income, between 30% and 35% of people choose to wild harvest and $\approx$5% cultivate.

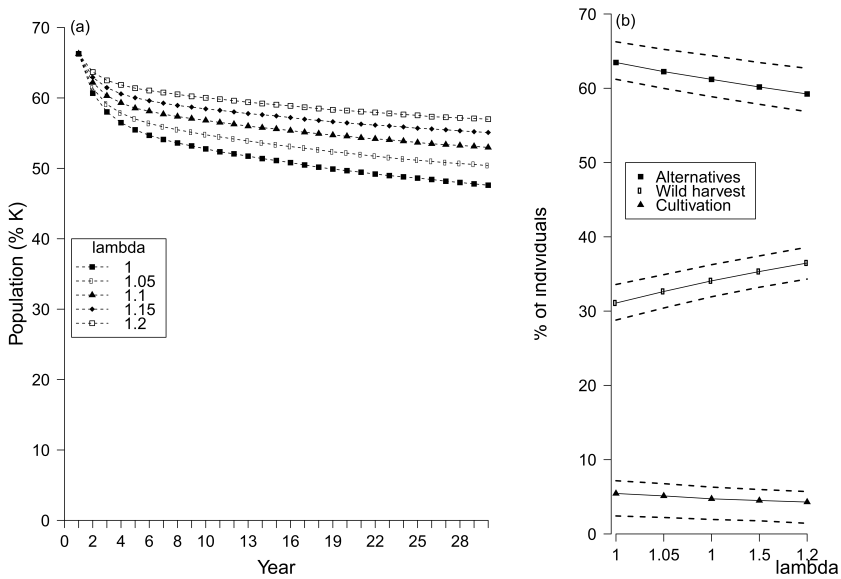

Fig. C1. Sensitivity of the wild population to different λ values over 30 years (a). Data points are the mean of 1000 iterations for each year. At $\lambda = 1$ the population reaches equilibrium $\approx$ 48 % of carrying capacity whereas at $\lambda = 1.2$ the equilibrium is reached at 60%. Panel b illustrates the livelihood choices of individuals under different scenarios of λ rate. Livelihood choices do not appear to be considerably sensitive to changes in λ. Under all λ values tested the majority of people find alternative income, between 30% and 35% of people choose to wild harvest and $\approx$5% cultivate.

Discount rates are likely to vary depending upon the cultural, social and economic context of the study. Experimental research in the USA found farmers have discount rates between 28% ($\pm$7.3) and 43% ($\pm$3.3) for decisions associated with payments for adopting conservation practices on farms (Duquette et al., 2012). We use the discount rates from this study to guide the upper bound in the sensitivity analysis. We vary the discount rate from 1% to 50% to assess how this influences uptake of cultivation. The sensitivity analysis shows at higher discount rates fewer people cultivate. Haggar et al. (2005) suggest

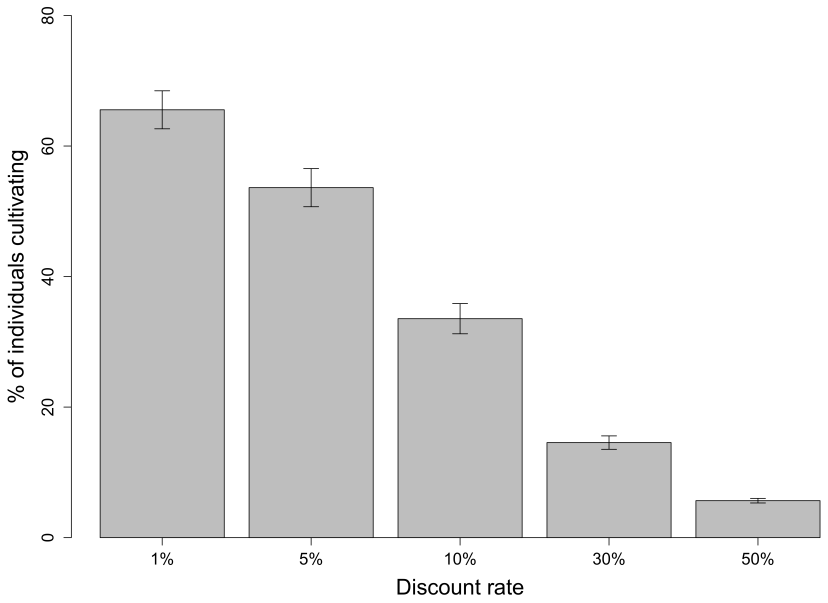

Fig. C2. Sensitivity of individuals decision making to the discount rate used. The percentage of individuals cultivating is calculated as a proportion of those that can cultivate (i.e. those with land). At higher levels of discount rate fewer people cultivate. The estimates showed are means of 1000 iterations with 95% confidence intervals.

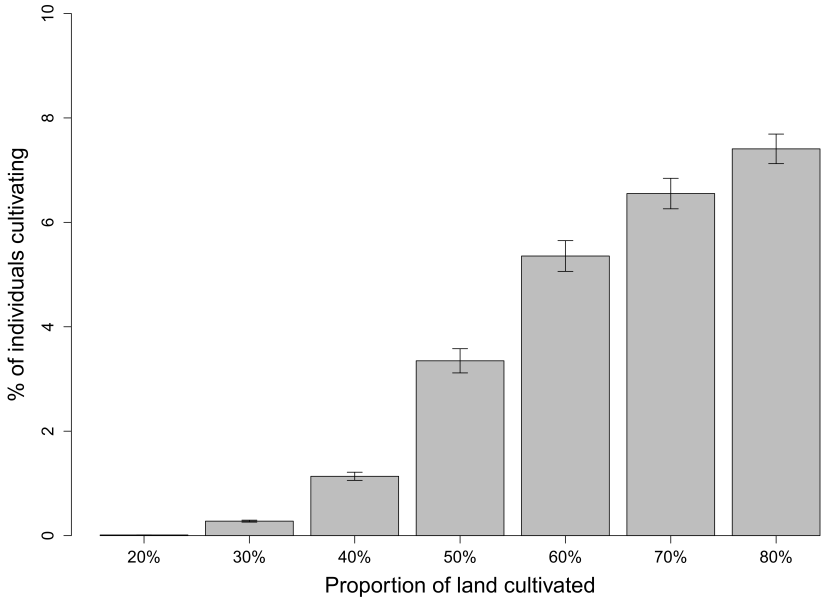

Fig. C3. Sensitivity of the proportion of an individuals land available for cultivation. The percentage of individuals cultivating is calculated as a proportion of those that can cultivate (i.e. with land). The estimates showed are means of 1000 iterations with 95% confidence intervals.

a discount rate of 10% for farmers in Mexico when examining adoption of agroforestry strategies. As we am unable to determine the discount rate specifically for Guatemalan subsistence farmers considering cultivating xaté, we use the rate from Haggar et al. (2005) as the default value. We carry out a sensitivity analysis to estimate the proportion of land individuals cultivate, assuming all individuals cultivate the same proportion (Figure C2). We test values from 20% to 80% of individual land available for cultivation (Figure C3). Less than 5% of the people interviewed cultivated and so we specify 50% of an individuals land available for cultivation as the default estimate.

Literature Cited

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