

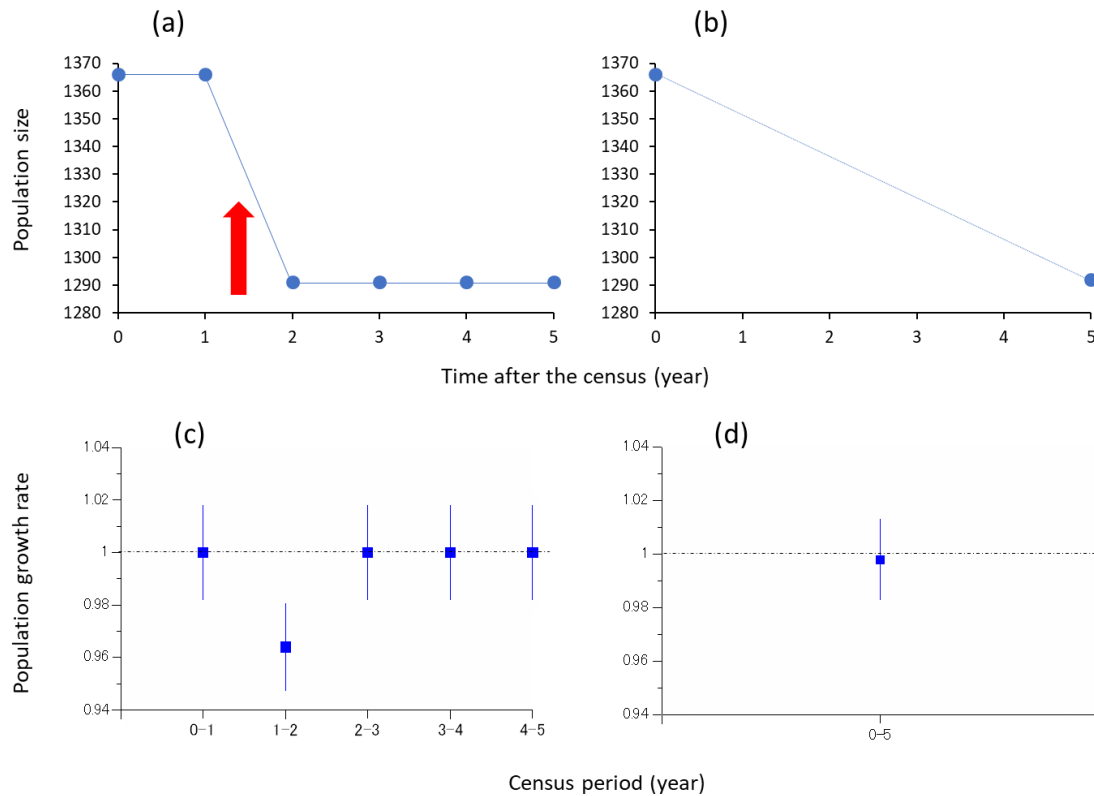


Fig. S1. Schematic diagram showing hypothetical population dynamics for 5 years of a tropical tree (a and b). Hypothetical population growth rates projected by a population transition matrix model (denoted by blue square) are also shown in c and d. The bars show the 95% confident interval of population growth rate. The original population size is 1366. This population encounters a severe drought in the second year (indicated by the red arrow) and decreases population size by 75 trees only in the year. In the other years, the population size remains unchanged. Finally, population size decreases to 1291 (a). If census is taken every year, we can detect the annual change in population size and make a population transition matrix model for every year. Let's assume that the population growth rate of the matrix for drought year is significantly lower than 1.0 (c). This suggests that population size is significantly decreased in the drought year. Consequently, ecologists would conclude that a severe drought have a significant impact on population dynamics of this tree species. However, in case that the census interval is 5-year, the conclusion would turn into different. Exact same with the above case, a severe drought hits in the second year and the population decreases 75 trees for 5 years (b). Because the census interval is 5-year, an ecologist can know only population sizes at the beginning and the end of the census. This imply that a sharply increased, drought-induced annual mortality is weakened by a normal mortality rate of non-drought for the other 4 years. Consequently, the 5-year average mortality rate gets much more

conservative than that observed in the drought year. Also, an ecologist only can make a population transition matrix model using the 5-year averaged, conservative mortality rate. This may make the population growth rate of the 5-year average matrix not significantly lower than 1.0 (d). This suggests that population size keeps unchanged in these 5 years, although population size is considerably decreased for this period. With this result, ecologists would conclude that a severe drought has a little impact on population dynamics of this tree species. This is an example of misinterpretation of impact of drought on population dynamics due to supra-annual census intervals.