Calculation of A Sustainable Quota Harvesting of Long-tailed Macaque (Macaca fascicularis Raffles) in Their Natural Habitats

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Abstract : The global demand for long-tailed macaques for medical experimentation has continued to increase. Fulfillment of Indonesian export demands has been mostly from natural habitats, based on a harvesting quota. This quota has been determined according to the total catch for a given year, and not based on consideration of any demographic parameters or physical environmental factors with regard to the animal; hence threatening the sustainability of the various populations. It is therefore necessary to formulate a method for calculating a sustainable harvesting quota, based on population parameters in natural habitats. Considering the possibility of variations in habitat characteristics and population parameters, a time series observation of demographic and physical/biotic parameters, in various habitats, was performed on 13 groups of long-tailed macaques, distributed throughout the West Java, Lampung and Yogyakarta areas of Indonesia. These provinces were selected for comparison of the influence of human/tourism activities. Data on population parameters that was collected included data on life expectancy according to age class, numbers of individuals by sex and age class, and 'ratio of infants to reproductive females'. The estimation of population growth was based on a population dynamic growth model: the Leslie matrix. The harvesting quota was calculated as being the difference between the actual population size and the MVP (minimum viable population) for each sex and age class. Observation indicated that there were variations within group size (24 – 106 individuals), gender (sex) ratio (1:1 to 1:1.3), life expectancy value (0.30 to 0.93), and 'ratio of infants to reproductive females' (0.23 to 1.56). Results of subsequent calculations showed that sustainable harvesting quotas for each studied group of long-tailed macaques, ranged from 29 to 110 individuals. An estimation model of the MVP for each age class was formulated as Log Y = 0.315 + 0.884 Log Ni (number of individual on ith age class). This study also found that life expectancy for the juvenile age class was affected by the humidity under tree stands, and dietary plants' density at sapling, pole and tree stages (equation: Y= 2.296 – 1.535 RH + 0.002 Kpcg – 0.002 Ktg – 0.001 Kphn, R2 = 89.6% with a significance value of 0.001). By contrast, for the sub-adult-adult age class, life expectancy was significantly affected by slope (equation: Y=0.377 = 0.012 Kml, R2 = 50.4%, with significance level of 0.007). The infant to reproductive female ratio was affected by humidity under tree stands, and dietary plant density at sapling and pole stages (equation: Y = -1.432 + 2.172 RH – 0.004 Kpcg + 0.003 Ktg, R2 = 82.0% with significance level of 0.001). This research confirmed the importance of population parameters in determining the minimum viable population, and that MVP varied according to habitat characteristics (especially food availability). It would be difficult therefore, to formulate a general mathematical equation model for determining a harvesting quota for the species as a whole.

Keywords : harvesting, long-tailed macaque, population, quota
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