ABSTRACT

Conservation of two megachiropterian bats of the Comoros Islands, a multidisciplinary and integrated approach

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The Comoros Islands are known for their important biodiversity with a high endemism rate for each taxonomic group. This natural richness face huge anthropogenic pressures due to a high rate of habitat loss and fragmentation estimated to be the highest in the word. Wild endemic mammals are the most threatened fauna in these islands. These species are often characterized by small population sizes making them highly vulnerable to disturbances. Indeed, small population size makes populations prone to allee effect, genetic drift or inbreeding depression, which subsequently conducts to a decrease of species' evolutionary potential, thus diminishing their long term viability. In order to understand the effect of habitat disturbance on the Comoros Islands natural fauna, I studied two endemic and highly threatened flying fox species (*Pteropus livingstonii* with a population size estimated of 1300 individuals and *P.seychellensis comorensis* whose population is estimated to few thousands of individuals). For that, I combined different approaches including spatial distribution and ecological niche modeling, as well as population demography and socio-economic approaches. This integrated approach is crucial to identify the different causes of mammals' population loss and propose relevant conservation measures. In a first part of this thesis, I show the results of the spatial distribution modeling and habitat selection of the two flying fox species as well as their geographic distribution ranges using Species Distribution Modelling (SDM) and Ensemble of Small Models approach specifically adapted to rare and threatened species. This first part allowed me to assess which ecological variables and anthropogenic pressures are determinant for the distribution of both species as well to characterize the degree of threat of the two species. In the second part of this thesis, I studied the genetic diversity and genetic population structure of both species among the four islands of Comoros with the aim to look for possible gene flow breaks between sub-populations but also to uncover which species face a high risk of extinction. This study highlights that these two phylogenetic and morphologically related species show different genetic structures among islands. In a third part, I explored the feasibility and costs of a non-invasive genetic monitoring protocol to obtain accurate population size, demographic parameters and develop a long-term monitoring of *P. livingstonii*. Due to the sensitivity of this species to capture and handling but also because of its rareness, a direct monitoring using classical capture-recapture method was not possible. This study showed that this approach is realistic but involves a high cost that seems to be unsuitable with the budgets available for conservation of the species in the Comoros Islands. In a fourth part of my thesis, I characterized the anthropogenic pressures that impacts both species using a socio-economic characterization of these islands (forest exploitation and hunting pressures among others) by using semi-structured interviews and a Q-methodology approach. This allows me to understand the relationship of local communities with the local biodiversity as well as to interpret the ongoing natural habitat evolution and to predict its future. In the last chapter (fifth), I combined the results of

all the different but complementary approaches used along the thesis with the aim to propose a management plan appropriate for these two species.

Key words: Natural habitat loss, Comoros Islands, *Pteropus livingstonii, P.seychellensis comorensis*, Conservation strategies