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# MATHEMATICAL MODELING OF POPULATION DYNAMICS IN BIOLOGICAL SPECIES

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The motivation behind this research is to investigate mathematical models to describe the population dynamics of biological species. In particular, we focus the attention on populations of large and long-lived raptor species. These species are mainly characterized by the lifetime stability of their breeding pairs and by a marked philopatry. The methodology based on population viability analysis (PVA), usually considered in conservation biology and in the management of threatened or endangered species, requires information about several variables (sizes, ages, mortality rates, growth rates, environmental variables, etc.) In practice, real data about such variables are difficult to obtain. Mathematical models based on other methodologies have not been sufficiently developed for these raptor species. Recently, in order to describe the demographic dynamics of such biological species, we have introduced a class of mathematical models, based on branching processes, see [1]. Unlike other classes of models developed in the literature, we have considered the most realistic practical situation where the coexistence in the population of individual from different generations is assumed. By considering such a class of stochastic models, we now study several statistical questions of ecological interest. As illustration, we apply the proposed methodology to describe the population dynamics of some Eurasian black vulture colonies located at the region of Extremadura (Spain) which appear to be both the largest and densest breeding colonies worldwide.

## References

[1] Corbacho, C., Molina, M., & Mota. M. (2019). *A mathematical model to describe the demographic dynamics of long-lived raptor species.* BioSystems, 180, 54-62. https://doi.org/10.1016/jbiosystems.2019.01.009

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