

The ability of individuals to adaptively alter their behavior and physiology in response to changing environmental conditions will determine the extent to which populations and species will adapt to a rapidly changing world. Understanding the responses that animals can make, and the limits of such phenotypic plasticity is crucial to maintain species diversity. In response to changing environmental conditions females may alter their reproductive strategy to improve the fitness of their offspring. There is an acute lack of research consider mate choice in relation to environmental condition. It is possible that extra-pair mate choice may represent adaptive behavioural strategy to compensate possible negative effects of poor environmental condition. The aim of this project is examine potential effect of environmental condition (i.e. climatic condition) on extra-pair mating in bird species. Using meta-analytical approach on more than 200 avian species and long-term data from field study conducted in a free living population of blue tits (*Cyanistes caeruleus*) I will test how variation in environmental condition affect the frequency of extra-pair paternity and the phenotypic expression of the predicted, genetically based differences between extra-pair offspring and within-pair offspring. Extra-pair matings are assumed to be costly, we may thus predict adaptive phenotypic plasticity in female propensity to engage in extra-pair matings. Specifically, I expect that under poor environmental condition female more likely engage in extra-pair copulation to enhance offspring fitness. I expect that nestlings originating from extra-pair matings to perform better in comparison to their half-siblings originating from within-pair matings under unfavourable environmental condition.

Extra-pair matings constitute a relatively common reproductive strategy in many socially monogamous bird species. However, this strategy is not fully understood and still invokes strong interest among behavioural ecologists. The research proposed herein will provide new insight into the complex nature of mate choice and its relationship with environmental condition on a global scale. Moreover, long-term data sets from blue tit population help establishing the importance of indirect benefits from mate choice in the ecological context. More generally, the results of this project may allow researchers to gain an understanding of under which environmental conditions will selection act to maintain a female mating bias towards extra-pair males and may thus contribute to resolving the long-standing puzzle of why female birds mate extra-pair so frequently.