Möglichkeiten und Grenzen der Analyse von Ursachen des Artenrückgangs aus herpetofaunistischen Kartierungsdaten am Beispiel einer langjährigen Erfassung

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Potentials and limitations of causal inferences on declines in the herpeto-fauna from mapping data illustrated by a long–term mapping example

Mapping data have been major sources for the documentation of amphibian and reptile declines and of potential threats. Often, all potential threats are taken as proven actual causes of decline although the presented data analysis is seldom sufficient for such claims. The potential for causal inferences is limited because of a general lack of rigorous field designs. Nevertheless, the potential of mapping data for such inferences is seldom fully realised. Therefore, comparisons of the relative importance of various potential threats among regions and thus the development of effective conservation strategies are hampered.

In this paper, potential methods for causal inferences are briefly outlined. The potential and limits of causal inferences from mapping data are illustrated with an example from an approximately 50 km^2 area west of Stuttgart, Baden–Württemberg, Germany. During a 26–years–period of data collecting without a design, 13 and seven species of amphibians and reptiles, respectively, were observed. Two amphibian species (*Hyla arborea* and *Bufo calamita*) became extinct, and two species (*Triturus cristatus* and *Rana esculenta/lessonae*) declined considerably. A total of 124 populations became extinct including the 54 unsuccessful recolonisation attempts out of a total of 107 observed recolonisations. Analysing the data as natural field experiments, only 24 % of the extinctions (22 unknown and 8 uncertain causes) remained unexplained in spite of the lack of a rigorous design. Habitat change was the prime factor responsible for declines; e.g., 24 % of the water bodies used for spawning disappeared. Pollution was the second major cause. Many extinctions were due to natural causes, but with the exception of two, they were limited to small and very small populations. Predation by fish caused two losses. No extinction could be attributed to other predators, collecting, competition with exotic species, or road traffic. However, a motor way build before the start of the mapping project acts as a barrier to the reinvasion of a partially restored spawning site at which amphibians became extinct due to pollution.

Recommendations for planning the collection of mapping data are made to improve their potential for causal inferences on declines.

Key words: Amphibia, Reptilia, mapping data, natural field experiments, causal analysis of decline: habitat loss, pollution, predation, collecting, exotic invaders, traffic.

Zusammenfassung

Kartierungen stellen die wichtigste Datengrundlage für die Dokumentation des Artenrückgangs von Amphibien und Reptilien und dessen potentiellen Ursachen dar. Häufig werden alle potentiellen Gefährdungen als tatsächlich belegte Ursachen