

The effects of soda pan dying on local insect diversity

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Over the last 70 years, the number of soda pans in the Seewinkel region has decreased significantly (Horváth, Ptacnik et al. 2019). This loss of habitat is often referred to as a consequence of decline in precipitation due to climate change (reference). However, a recent study from Apetlon on the lake Neusiedl region has shown that the highest numbers of soda pans were recorded in years of low precipitation, thus indicating that there must be other disturbances, mostly of anthropogenic origin, causing the ongoing soda pan dying (Krachler et al. 2012). Habitat loss is often accompanied by loss of biodiversity. For example, a longitudinal study, published by Horvath et al. in 2019, examined the long-term impacts of soda pan habitat loss in the lake Neusiedl region on invertebrate species living in ponds. They were able to verify that habitat loss led to local and global species loss.

In our study, we aimed to investigate the changes of biodiversity of insects and plants occurring in different stages of the soda pan destruction. We compared two different habitat types (intact dry soda pan, dying dry? soda pan) of different soda pan destruction stages and as control we sampled on meadows. Of each habitat type and the control we had three replicates. We set pitfall traps for seven hours during the day and scoop netted at each location. Plant species identity and diversity was estimated at each site. The insects were classified to the order or species level. Additionally we took data of environmental parameters including vegetation and soil samples. We performed linear models to identify relationships between habitat types and insect diversity as well as related environmental parameters.

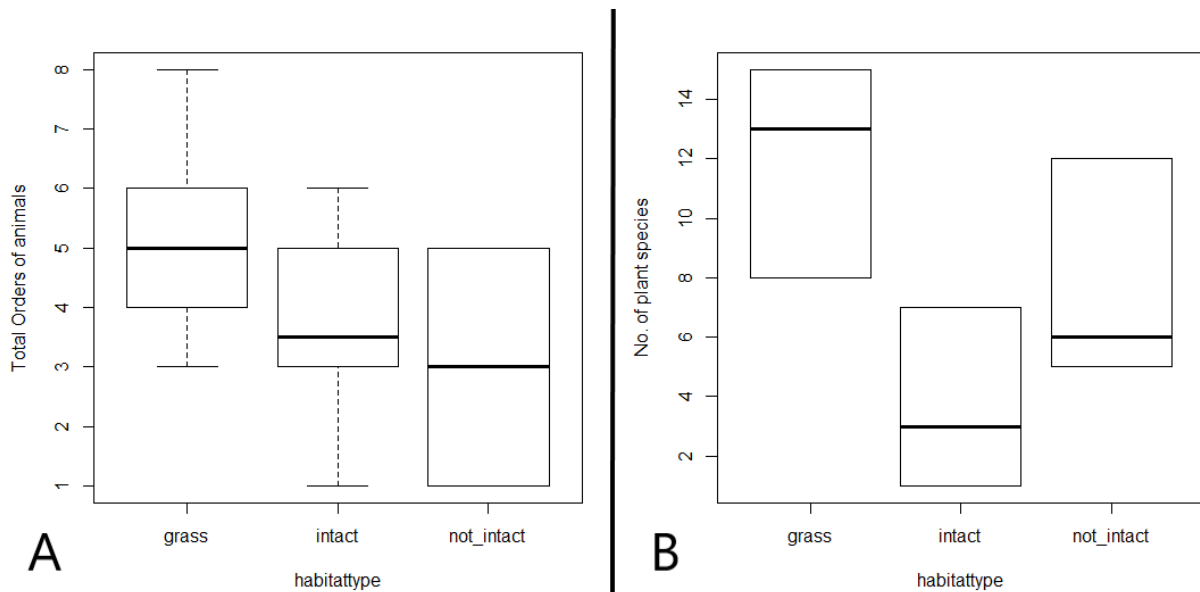


Figure 1: A: Differences in number of orders between habitat types, $dF=2,15$, $\chi^2 = 3.6689$, $P=0.1597$ (GLM, poisson); B: Differences in total number of plant species between habitat types, $dF=2,15$, $F\text{-test}=28.032$, $P= 0.002105$ (GLM, quasipoisson)

There was a non-significant trend of grass habitats hosting a bigger number of animal orders (Fig. 1A) and a significant effect of habitat type on number of plant species (Fig. 1B). The intact soda pan habitat showed a large variation in number of? Or specific? animal orders, but it is definitely visible that the total numbers of animal orders are lower than in the grass habitat. This trend indicates that soda pans may hold a smaller number of animal orders and plant species, which are more adapted to this extreme habitat. Meadows showed a broader spread, and on average more animal orders. We could not identify a loss of local biodiversity in the disturbed soda pan habitats, we assume this might be due to the emerging meadow habitat which naturally houses more species than the extreme soda pan habitat. We suggest a loss of highly adapted specialists, but since we only identified the insects

to the order level, we were not able to detect such events. Tendencies in that direction could be shown in plant compositions, but further research on the species level on insects is necessary.

References:

Horváth, Z., et al. (2019). "Habitat loss over six decades accelerates regional and local biodiversity loss via changing landscape connectance." *Ecology Letters* **22**(6): 1019-1027.

Krachler R, Korner I, Dvorak M, Milazowszky N, Rabitsch W, Werba F, Zulka P & Kirschner A (2012). "Die Salzlacken des Seewinkels: Erhebung des aktuellen ökologischen Zustandes sowie Entwicklung individueller Lackenerhaltungskonzepte für die Salzlacken des Seewinkels (2008–2011)". Krachler R, Kirschner A & Korner I (Redaktion). Verlag & Hrsg. Österreichischer Naturschutzbund, Eisenstadt, Österreich; ISBN 978-3-902632-23-4