SAND DYNAMICS IN COASTAL DUNES AND ITS ECO-EVOLUTIONARY FEEDBACKS ON ARTHROPOD SPECIES PERSISTENCE

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In coastal dunes, aeolic dynamics (e.g. severe sand displacements) comprise an essential geomorphological process that retains the landscape into its dynamic phase (Provoost, 2004), i.e. characterised by absence of soil development and extreme microclimatological conditions with high summer temperatures. Aeolic disturbance originates primary from natural sand displacement in blond dunes, but also secondary through anthropogenic disturbance, i.e. by trampling of recreants and large herbivores. These processes at the local scale are tightly linked to landscape processes that relate to the overall openness of the dune landscape. In order to understand which species benefit from sand dynamics and how landscape processes interact with local processes, we performed both mechanistic and correlative research to detect bottlenecks for species persistence within the process of changing disturbance dynamics at different spatial levels (see selected references below) using arthropods as a model. At larger spatial scales, shifts in species composition in relation to decreasing sand dynamics are more pronounced in dynamic landscapes and species from dynamic sites are more vulnerable and more prone to extinction than their counterparts from stabilised fragments because of specific life history adaptations. Maintenance of sand dynamics at a landscape level rather than at a local level appears to be of primordial importance for species conservation. At the local scales, secondary sand dynamics through the action of recreation appeared to be much more beneficial than those created by cattle trampling. We finally demonstrated that the loss of sand dynamics may induce evolutionary changes in dispersal, with subsequently cascading effects on species persistence.

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