Media Information

TECHNISCHE UNIVERSITÄT DARMSTADT

A Helping Hand for the Ecosystem

TU Darmstadt: Restoration strengthens the resilience and function of pollination networks

Communication and Media
Corporate Communications

Karolinenplatz 5
64289 Darmstadt, Germany

Contact:
Silke Paradowski
Tel. +49 (0)6151 16 200 19
Fax +49 (0)6151 16 237 50
paradowski.si@pvw.tu-darmstadt.de

www.tu-darmstadt.de/presse
presse@tu-darmstadt.de

Darmstadt, 31st January 2017. Removing exotic plant species has a much greater impact on ecosystems than previously thought. Pollination processes become more efficient, and the pollination network soon becomes more resilient. These are the findings of a major field study carried out on the Seychelles, details of which biology researchers of the TU Darmstadt are now publishing online, before an article appears in the scientific journal, *Nature*.

Ecosystem restoration often focuses on plant species, explains PD Dr Christopher Kaiser-Bunbury, member of the Ecological Networks Study Group of the TU Darmstadt Biology Department. Kaiser-Bunbury is the lead author of the article "Ecosystem restoration strengthens pollination network resilience and function" which is published in the international journal *Nature*. An established method was used to remove all non-native plants that were becoming too dominant and invasive. "Up until this point, however, we did not know whether interfering with the vegetation in this way would have any effect on pollinators and, in turn, on important processes within the ecosystem." This very question was the focus of biologists in a research project carried out on eight inselbergs on the Seychelles' largest island, Mahé.

In a defined area on four inselbergs, all exotic flora – such as cinnamon, eucalyptus and Prune de France – was removed, leaving behind the original, native vegetation. For comparison, the vegetation of four other inselbergs was left untouched.
Kaiser-Bunbury and his team observed the plants, and counted and catalogued the pollinating animals – bees, wasps, flies, beetles, moths, butterflies, birds and geckos – over a period of eight months from September 2012 to May 2013. The resulting data reveals the significant impact of vegetation restoration. On the restored inselbergs, the team noted up to 22% more pollinator species, with pollinators visiting plants 23% more frequently. Plants produced around 17% more flowers, which correlated with a significantly higher fruit yield.

Generalised pollinators visit a wider variety of plant species

These observed findings allow researches not only to draw conclusions from the direct species patterns, but they also provide an insight into the underlying interactions within the ecosystem. According to Kaiser-Bunbury,

restoration improved the quality of pollination. Plants needed fewer visits from pollinators to produce a higher proportion of fruit to develop. The interaction between plants and pollinators also became more complex: pollinator species in the restored systems were more generalised than those in the non-restored inselbergs. Generally speaking, pollinators were considerably less selective and visited more plant species in the restored communities. “Our experiments suggest that restoration results in functionally diverse and stronger plant and animal networks,” explains Kaiser-Bunbury. “The study shows that damage within an ecosystem is reversible, at least to a certain extent.” Patterns to support this conclusion were observed by Kaiser-Bunbury and his team just a few months after restoration work had been carried out.

One of the factors that enable the system to respond rapidly to restoration could be the concept of “ecological memory”, as Kaiser-Bunbury explains. The high pollination rate may be due to interactions between different pollinator species that show functional similarities to the original community and processes. This explains how they can quickly and efficiently react to any disturbance. It is also possible that pollinators from the surrounding forests are able to return to inselbergs once they have been restored, to visit native flowers. Because the overgrowth of exotic plants has been removed, pollinators can find and approach native flowers more easily. The thinned vegetation also means that pollinators lose less pollen as they move from one plant to another.

When restoration involves the removal of exotic species it allows native plants to get more light, water and nutrients, the latter of which are scarce on the Seychelles. This study goes beyond these direct effects of restoration. The authors show that there is a clear relationship between the composition of the ecological network and its overall functions. According to Kaiser-Bunbury, restoration does not aim to return a degraded area to its original state. “We demonstrate that restoration plays a role in reactivating natural processes. In other words, it’s a helping hand to restore balance to the system.”

Internet:
http://www.econetlab.net/dr-ckaiserbunbury

The article:
The article entitled “Ecosystem restoration strengthens pollination network resilience and function” can be consulted at:
http://dx.doi.org/10.1038/nature21071

TECHNISCHE UNIVERSITÄT DARMSTADT

Images
are available for downloading at http://bit.ly/2jmzEe5

Contact:
PD Dr. Christopher Kaiser-Bunbury
Tel.: +49 (0)6151 162 00 38
E-Mail: ckaiser-bunbury@bio.tu-darmstadt.de

MI-Nr. 09e/2017, sip