

Dragonflies, as climate change indicators

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Credit: Heiner Blischke

Monitoring communities of climate sensitive species, such as insects, could enable scientists to develop indicators for climate change effects on biodiversity and help devise policies to protect it.

With [climate change](#), flora and fauna shift their seasonal inner clock. For example, [fruit tree](#) blossom earlier than previous years. But many species may not be able to adapt as quickly as the climate changes, according to a recent report by the European Environmental Agency. As a result, there is currently a need to develop simple metrics of [climate impacts](#) on [biodiversity](#). This could help policy makers to develop biodiversity protection measures to mitigate and adapt to the effect of climate change.

Insects, for example, are good climate indicators as their development depends on temperature. [German scientists](#) have now found that the regional composition of butterfly and dragonfly communities has already changed in the last decades. This is according to a study called "Climate Change and Biodiversity" about to be published within two months. "We know a great deal from modelling studies [about climate impact on biodiversity], but we know to a lesser extent what really happens," Maik Denner, one of the study's co-authors, tells youris.com. He works as a nature conservation scientist at the State Office for the Environment, Agriculture and Geology in Dresden, Germany.

The study is based on using biodiversity monitoring to assess the effect of climate change, as established biodiversity monitoring programmes such as existing ones in Switzerland, the UK and Germany's North Rhine-Westphalia. In their study, the scientists used [species distribution](#) and monitoring data to calculate the so-called community temperature index (CTI) of butterflies and, for the first time, [dragonflies](#).

Changes in the CTI over time, correlated with changing temperature, indicate shifts in the species composition of a particular community. If it increases, as in the present study, "the proportion of warm-temperature dwellers increases while the proportion of cold-temperature dwellers decreases," Denner explains. However, the CTI of both communities did not change to the same extent as the temperature did. This suggests that the observed shifts were not able to compensate for the observed rise in temperature.

"If [the CTI] increases, you know that it is a direct biodiversity response to climate change," comments Vincent Devictor, researcher of the Institute of Evolutionary Sciences in Montpellier, France, who previously led a study monitoring species from seven European countries. Now "policy makers can read the intensity of climate change using this simple metric," he adds. His own work based on CTI

calculation showed that European butterfly and bird communities have shifted northwards within two decades without being able to keep pace with rising temperature.

Experts doubt, however, that temperature effects alone caused the changes in butterfly and dragonfly communities. "In principle, the CTI is a promising indicator concept", says Ulrich Sukopp, a monitoring expert at the Federal Agency for [Nature Conservation](#) in Bonn, Germany, who works on establishing climate change indicators. The challenge, he tells youris.com, is that the correlation between temperature and CTI has to be clearly demonstrated: "We also need more and better monitoring data."

Another issue is that applying the CTI for smaller areas may be "problematic", since changes in land use can affect the index. "It's more robust when applied to larger regions", Ingolf Kühn coordinator of the EU-project MACIS and senior scientist at the department of Community Ecology at the Helmholtz Centre for Environmental Research (UFZ) in Halle, Germany, tells youris.com. The project designed to study the impacts of climate change on biodiversity contributed to a 2009 EC white paper titled "[Adapting to climate change: Towards a European framework for action](#)." Kühn points to the need to develop "intelligently designed" monitoring programmes in the future.

Provided by Youris.com

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