

Diverse landscapes are more productive and adapt better to climate change

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Switzerland from a satellite perspective: The vegetation's average biomass production (orange: low, green: high) is strongly increased in landscapes with high biodiversity. Credit: UZH

Ecosystems with high biodiversity are more productive and stable towards annual fluctuations in environmental conditions than those with a low diversity of species. They also adapt better to climate-driven environmental changes. These are the key findings environmental

scientists at the University of Zurich made in a study of about 450 landscapes harbouring 2,200 plants and animal species.

The dramatic, worldwide loss of [biodiversity](#) is one of today's greatest environmental problems. The loss of [species](#) diversity affects important [ecosystems](#) on which humans depend. Previous research predominantly addressed short-term effects of biodiversity in small experimental plots planted with few randomly selected plant species. These studies have shown that species-poor plant assemblages function less well and produce less biomass than species rich systems.

Extensive study with about 2,200 species in 450 landscapes

Researchers participating in the University Research Priority Programme "Global Change and Biodiversity" of the University of Zurich now demonstrate similar positive effects of biodiversity in real-world ecosystems in which mechanisms different from the ones in artificial experimental plots are at play. Using 450 different 1-km² landscapes that spanned the entire area of Switzerland, they investigated the role of the diversity of plant, bird and butterfly species for the production of biomass, which was estimated from satellite data.

"Our results show that biodiversity plays an essential role for the functioning of extensive natural landscapes that consist of different ecosystem types such as forests, meadows or urban areas", study leader Pascal Niklaus from Department of Evolutionary Biology and Environmental Studies says. The analyses showed that landscapes with a greater biodiversity were more productive and that their productivity showed a lower year-to-year variation.

Biodiversity promoted the adaptation of landscapes

The satellite data analysed by the scientists revealed that the annual

growing period increased in length throughout the last 16 years, an effect that can be explained by climate warming. The prolongation in growing season was considerably larger in more biodiverse landscapes. These relations were robust and remained important even when a range of other drivers such as temperature, rainfall, solar irradiation, topography, of the specific composition of the landscapes were considered. "This indicates that landscapes with high biodiversity can adapt better and faster to changing [environmental conditions](#)," Niklaus concludes.

More information: Biodiversity promotes primary productivity and growing season lengthening at the landscape scale. *Proceedings of the National Academy of Sciences*. September 4, 2017. [DOI: 10.1073/pnas.1703928114](#)

Provided by University of Zurich

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