

The constant addition of nutrients into our ecosystems is depleting biodiversity

May 28 2020, by Harald Rösch

Many low-nutrient ecosystems are particularly rich in species. Are added nutrients therefore detrimental to diversity? "That's true for many habitats," says Sönke Zaehle from the Max Planck Institute for Biogeochemistry in Jena. The scientist is studying how nutrients impact the material cycle in ecosystems, and how the atmosphere and the surface of the ground influence each other.

Are nutrients bad news for biodiversity?

Zaehle: It's not possible to make such a generalised statement, but it is true for many habitats. Take grassland on poor soil in moderate climates, for example. In Germany, meadows on low-[nutrient](#) soil are among the most biodiverse habitats. A large number of studies show that biodiversity declines when the amount of nutrients added to the soil increases.

Why do higher nutrient levels not lead to greater biodiversity? After all, this means that there are enough nutrients for all plants.

Yes, you might think that. But usually, only a few [species](#) can thrive on more nutrients. They are the ones that are particularly well adapted to such conditions and which can grow faster than species that have adjusted to poor soil conditions. These highly competitive species take light and space away from other plants. Nutrient-rich ecosystems

therefore often only benefit a small number of species. However, if only a small amount of nutrients are available from the start, the many species that are not as strongly competitive have a chance of surviving.

What nutrients are we talking about here?

We are mainly talking about nitrogen and phosphorous. In central Europe, the availability of nitrogen inhibits the productivity of most rural ecosystems, while in severely weathered soils in the tropical rainforests, it tends to be phosphorous that is the problem.

What impact do high nutrient levels have?

First, the species composition changes. Also, the nutrient content of the plants themselves can change. Plants that are fertilised with nitrogen, for example, store more nitrogen, and their nitrogen:phosphorous ratio is therefore higher. As a result, the plants' growth is increasingly inhibited by the presence of phosphorous.

These changes can also have an impact on [animal life](#). Since plant-eating animals such as insects are adapted to a particular nutrient content in their food, such changes can have a [negative effect](#) on their metabolism and therefore on the number and distribution of these animals.

Some scientists think that the over fertilisation of our natural habitats is the greatest threat to biodiversity in Germany. On top of that, the groundwater is also being polluted with nitrate. Why not simply reduce the level of fertilisation?

Quite clearly, the current level of productivity in the agricultural sector

can't be maintained without fertilisation. However, the correct level of fertilisation depends on a large number of different factors, such as the plants being cultivated, the soil and the weather. In general, greater effort should be made at the local level to determine the actual amount of fertilisation needed. It is also important that nitrogen losses caused by fertilisation are reduced by more efficient spreading methods or adjusted fertilisation schedules. In this way, it would be possible to decrease the level of nutrients added through agriculture and in so doing reduce the levels added to other ecosystems.

However, agricultural fertilisation is not the only way in which nutrients end up in ecosystems. Nitrogen oxides in car exhaust fumes or from industrial plants also increase nutrient levels. This is one of the reasons why nutrient levels even increase in areas that are not fertilised themselves. For example, over the years, this unintentional fertilisation can lead to very high [nitrogen](#) levels in the [soil](#) in forests.

Are we using too much fertiliser in Germany?

That's also too generalised a statement. However, some regions quite clearly have a considerable, long-term excess of nutrients. This is where we urgently need to act! In particular in areas where there is intensive pig and cattle farming, the farmers have a problem disposing of the animal excrement. More animals are kept than there is space for disposal.

Will the new ordinance on fertilisation have any effect?

Overall, the new measures are going in the right direction. We'll have to see whether they are sufficient, and whether they can be implemented as intended. However, the problem with fertilisation goes beyond issues

such as the permitted level of fertilisation and when fertilisation is allowed. We have to create closed material cycles as quickly as possible. In other words, only those nutrients should be added that are removed again when the crops are harvested.

Without a paradigm change among consumers and a reduction in the amount of meat we eat, we will never be able to overcome the problem of over [fertilisation](#) of whole swathes of land.

Provided by Max Planck Society

Citation: The constant addition of nutrients into our ecosystems is depleting biodiversity (2020, May 28) retrieved 7 August 2024 from <https://phys.org/news/2020-05-constant-addition-nutrients-ecosystems-depleting.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.