

Global prices of pollination-dependent products such as coffee could rise in the long term: study

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This shows pollinator *Osmia rufa* "at work." Credit: Photo: Susan Walter/UFZ

In recent years the economic value of pollination-dependent crops has substantially increased around the world. As a team of researchers from the Helmholtz Centre for Environmental Research (UFZ), the Technical University of Dresden and the University of Freiburg headed by the UFZ wrote in an article entitled "Spatial and temporal trends of global pollination benefit" in the open-access journal *PLoS ONE* the value of ecological pollination services was around 200 billion US dollars in 1993 and rose to around 350 billion US dollars in 2009. For the first time, the researchers were also able to show in which regions of the world pollination plays a particularly important role and agriculture is furthermore particularly dependent upon the pollination carried out by

animals.

The researchers analysed this relationship on the basis of 60 crops, such as coffee, cocoa, apples and soya beans, which are dependent upon pollination by animals, mostly insects such as [honeybees](#) and wild bees, [butterflies](#) or [bumble bees](#). These investigations enabled them to create a global map showing the dependence of [agricultural yields](#) upon pollination. "We can now estimate with a high degree of [spatial resolution](#) how large this contribution is in many regions", says the main author, Dr. Sven Lautenbach, researcher in the UFZ Department of Landscape Ecology. Particularly countries such as China, India, the USA, Brazil and Japan greatly benefit from pollination-dependent products. For the first time, the researchers have analysed this effect at the regional level: In the USA, for example, the dependence is particularly high in California and in the [corn belt](#) in the Midwest relatively unimportant. In Asia the northeast region of China is particularly dependent upon pollination, in Europe primarily the Mediterranean countries, such as Italy or Greece, and in Africa especially the region along the Nile in Egypt. For Germany the researchers found moderate dependencies – nevertheless, in Germany as well pollination is in no way immaterial.



In recent years the economic value of pollination-dependent crops has substantially increased around the world, wrote scientists in the open-access

journal *PLoS ONE*. Credit: Photo: André Künzelmann/UFZ

Globally, the value of pollination-dependent agricultural products, and therefore the value of this ecosystem service, has risen continuously. This is attributable to a significant increase in production quantities for pollination-dependent crops. Since 2001 the costs of production for pollination-dependent crops have also risen significantly, indeed far faster than the prices of non-pollination-dependent field crops such as rice, grains or maize. For the researchers this is an indication that the intensification of agriculture is reflected in a global price increase for pollination-dependent cultures. When fields are sprayed with more pesticides, more fertilisers are applied and valuable agricultural structural elements, such as hedges and rows of trees, are transformed into fields, the insects vanish. Consequently, the extent of pollination is reduced, and this is reflected in higher production prices. "We see this price increase as an initial warning signal that conflicts could arise between the services of insect-related pollination and other agricultural interests", says Sven Lautenbach. For example, if such valuable habitats for insects as hedges, rows of trees or field margin structures continue to disappear and be transformed into agricultural areas or residential areas in the countries in which production takes place, in future the prices for coffee and cocoa will likely rise in future.

According to the calculations of the researchers, a potential decline of pollination could particularly affect those countries in which pollination-dependent crops or cultures represent a substantial part of the gross domestic product from agriculture. This includes, for example, Argentina, Belgium, China, Ghana, Honduras, the Ivory Coast, and Jordan. The researchers have also been able to show, that in countries such as Azerbaijan, Armenia, Cameroon or the Ukraine the relative dependence on these agricultural products has increased significantly

between 1993 and 2009. In countries such as Egypt, India, Jordan or Turkey, on the other hand, the relative dependence declined during the same period.



The value of ecological pollination services was around 200 billion US dollars in 1993 and rose to around 350 billion US dollars in 2009. Credit: Photo: André Künzelmann/UFZ

The results of the spatial analysis provide important information for nature conservation practice and political decisions. This enables the development of recommendations at the regional level for the protection of agricultural elements vital for the survival of insects. Furthermore, the information could be used to set up market instruments such as payment for ecosystem services (PES). This instruments could for example, require users benefitting from pollination services to pay for these services. "This could encourage incentives for the protection of insects and their [pollination](#) services", says Sven Lautenbach. Benjamin Haerdle

More information: Sven Lautenbach, Ralf Seppelt, Juliane Liebscher,

Carsten F. Dormann (2012): Spatial and temporal trends of global
pollination benefit. *PLoS ONE*
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