Tree islands – new approach to cut biodiversity loss in oil palm plantations

Oil palm plantations have been blamed for habitat and biodiversity loss for decades and experts may have found a way around it – by creating so called ‘tree islands’ near oil palm plantations, according to earth.com writer Andrei Ionescu in a recent article.

Oil palm plantations lead to considerable losses of biodiversity and ecological functions. Currently, about 21 million hectares of palm oil plantations are cultivated worldwide, particularly in Indonesia and Malaysia who account for about 85% of global oil palm.

Recently, an international team of scientists led by the University of Gottingen has found that planting islands of trees in such plantations could counteract the species loss caused by the intensive cultivation of oil palms and significantly increase biodiversity within a period of five years without reducing productivity.

To test this hypothesis, the researchers established 52 tree islands with local tree species in an industrial oil palm plantation on the island of Sumatra. Although they expected yields to deteriorate over time as the tree islands consumed resources for their own development, this was not the case.

“Even five years after the experiment began, the oil palms have continued to flourish. And this has been accomplished without the use of artificial fertilizer in the tree islands,” said study lead author Delphine Clara Zemp, an expert in Biodiversity and Ecosystem Functioning at the University of Neuchatel. “Our results show that the industry can benefit from this intervention. There is real potential to develop these methods to enrich biodiversity on a large scale.”

Between three to five years after establishing the experiment, the scientists analysed the biodiversity of soil microorganisms, insects and other small invertebrates, plants, birds, and bats. In addition, they quantified the impacts in terms of water, nutrient cycle regulation, carbon, microclimate, soil quality, pollination, and control of biological communities and invasive species.

The analyses revealed significant increases in biodiversity and ecosystem functioning in plantations with tree islands compared to conventionally managed ones.

“Most studies of the ecology of palm oil plantations are limited to observing the loss of biodiversity and deterioration of the ecosystem,” added co-author Holger Kreft, Head of University of Göttingen’s Biodiversity, Macroecology, and Biogeography Research Group.

“Our approach to ecological restoration goes a step further and is unique worldwide, as it takes place against the backdrop of industrial-scale oil palm plantations across large areas. Using a rigorous experimental design, we can determine the optimal composition and size of islands of trees

that will bring about the best possible way to restore the ecology."

Although these findings suggest that planting tree islands on oil palm plantations can have highly beneficial effects, the prevention of deforestation remains a top priority for biodiversity conservation worldwide.

"The encouraging results must not be allowed to jeopardize the conservation of tropical forests, which are home to irreplaceable biodiversity," the authors concluded.

The study is published in the journal Nature.

Environmental impacts of palm oil plantations

Palm oil plantations can have several significant environmental impacts. Here are some of them:

Deforestation

One of the most devastating impacts of palm oil production is the large-scale deforestation that often precedes it. Vast areas of tropical rainforests in Southeast Asia, Latin America, and Africa are cleared to make way for palm plantations. This process not only destroys the habitat of numerous plant and animal species but also contributes significantly to global carbon emissions due to the burning and decay of organic matter.

Biodiversity loss

The conversion of diverse ecosystems into monocultures of palm trees significantly reduces biodiversity. In Southeast Asia, for example, this deforestation threatens the habitat of critically endangered species such as orangutans and Sumatran tigers. Biodiversity is crucial for ecosystem health and resilience.

Soil and water degradation

Palm oil plantations often contribute to soil degradation due to intensive fertilizer use and the disruption of local hydrological processes. Additionally, the heavy use of pesticides can contaminate local water supplies.

Climate change

Deforestation associated with palm oil production is a significant source of greenhouse gas emissions. When peatlands are drained and converted into plantations, they release large quantities of carbon dioxide (CO2) into the atmosphere. Furthermore, when these plantations are burnt, it releases additional CO2.

Air pollution

The slash-and-burn techniques often used to clear land for palm oil plantations can cause severe air pollution. This not only contributes to climate change but can also have severe health impacts for people living in regions downwind of the fires.

Peatland degradation

A significant proportion of palm oil is grown on peatlands. These are carbon-rich environments, and when they are drained for plantation development, they release significant quantities of carbon dioxide.

While these impacts are significant, it's also important to note that there are efforts to create more sustainable palm oil production methods.

These include commitments to no deforestation, peatland development, and exploitation (also known as "NDPE policies"), as well as the certification of sustainable palm oil through organizations like the Roundtable on Sustainable Palm Oil (RSPO).

Nevertheless, the effectiveness and implementation of these initiatives have been mixed, and deforestation for palm oil continues to be a serious global concern.