Biodiversity loss: Many students of environment-related subjects are partly unaware of the causes

August 30 2024, by Markus Bernards

If invasive species—such as the lionfish in the Atlantic—are not a major problem in the respondents' countries, the respondents tended to underestimate their significance for biodiversity loss. Credit: Matthias Kleespies/Goethe-Universität Frankfurt

As far as the causes of global biodiversity loss are concerned, there are evidently perception gaps among students of environment-related subjects worldwide, as a survey conducted by Goethe University Frankfurt with more than 4,000 students from 37 countries has now shown.

The gaps vary from country to country: In some countries, climate change tends to be underestimated as one of the causes of biodiversity loss, in others it is invasive species, and in yet others it is pollution. The survey also shows that country-specific indicators greatly influence the students' perception.

Of the estimated 10 million, mostly still undiscovered species of flora and fauna on Earth, 1 million could become extinct in the next decades. This loss of biodiversity would have dramatic consequences, as animals and plants are providers of multiple services. They maintain ecosystems, ensure a more balanced climate on our planet, and supply us with food and active substances for medical drugs. Put bluntly, without biodiversity, we humans will not survive.

That is why there is an urgent need for resolute political measures to counter the "sixth mass extinction" in Earth's history. One group of people who are particularly important are today's students of environment-related subjects. Many of them will foreseeably occupy influential positions in environmental policy and business in the future—and play a key role in deciding whether the global decline in

biodiversity is combated effectively.

But just how knowledgeable are the decision-makers of tomorrow? Are they capable of identifying the main causes of biodiversity for what they are—and distinguishing them from factors that have no influence whatsoever on biodiversity? "Our study is the first to have examined these questions scientifically at the global level," says Dr. Matthias Kleespies from the Department of Didactics in the Biological Sciences at Goethe University Frankfurt.

The work is [published](link) in the journal *npj Biodiversity*.

Together with other researchers in Frankfurt, Kleespies conducted an online survey among about 4,400 students on environment-related degree programs in 37 countries, who were given a questionnaire listing eight drivers of global biodiversity loss. These included the five actual causes: climate change (more and more droughts as well as other consequences of global warming), overexploitation (such as overfishing), habitat loss (for example through deforestation), displacement by invasive species, and pollution (air pollution, plastic waste, oil spills).

The questionnaire additionally listed three factors that have little or no impact on biodiversity: electrosmog, factory and traffic noise, and the internet. The interviewees were asked to indicate the extent to which they thought the eight factors were responsible for the decline in biodiversity. The scale ranged from 1 (minor influence) to 5 (major influence).

To analyze the completed questionnaires, the researchers used a special method that recognizes patterns in data. The outcome was eight different groups with clusters of specific, easily distinguishable response types.
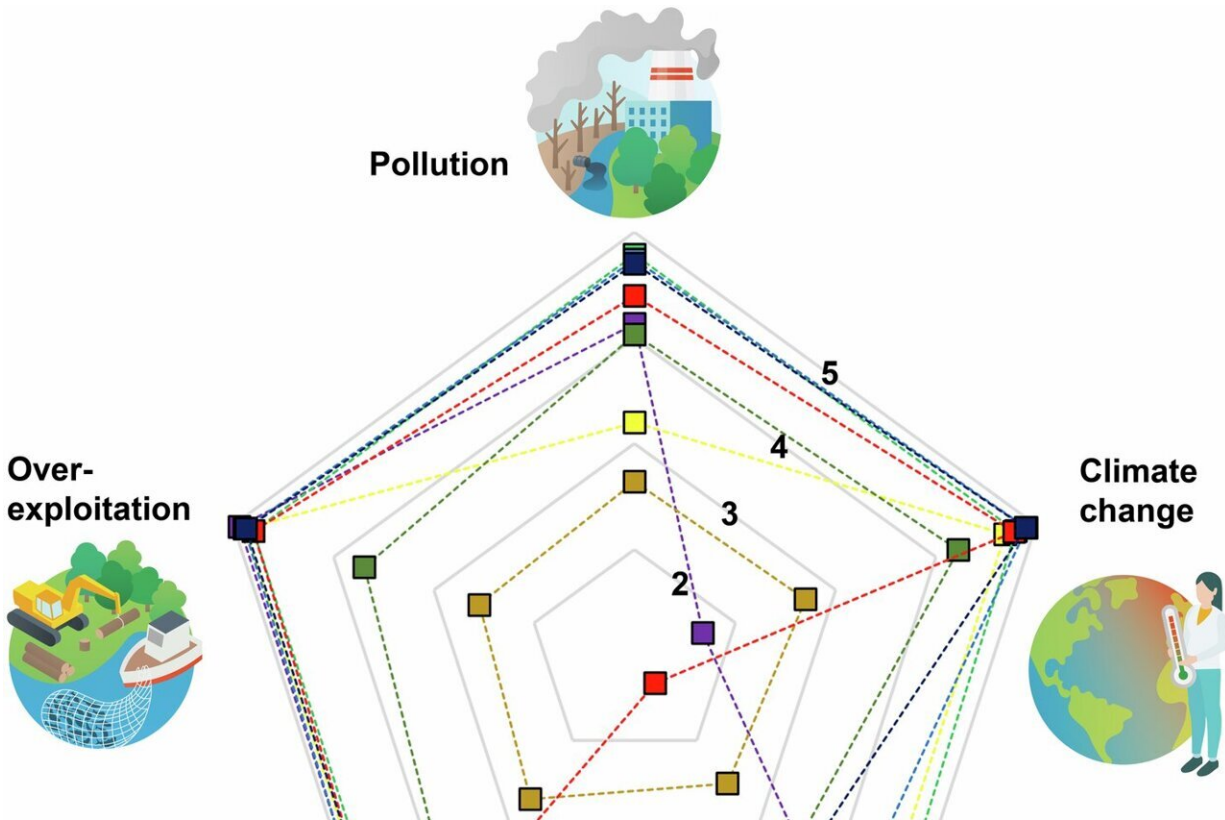
Representation of the response behavior of the eight different response types. Credit: *npj Biodiversity* (2024). DOI: 10.1038/s44185-024-00057-3

Kleespies explains, "In response type 1, for example, all the main causes are recognized except for climate change. The students underestimate its influence on the decline in biodiversity." In type 2, on the other hand, pollution plays a subordinate role, and in type 7 invasive species. Type 3 is a special form in which all the main causes are underestimated and not even distinguished from irrelevant factors such as noise.

"Fortunately, the number of such responses was comparatively low," says Kleespies. Overall, the eight response types occur with varying frequency in the countries under study.

In the next step of the evaluation, the research team examined the background to the responses: What induces the different response types? Here, the researchers incorporated country-specific indicators: the country's CO_2 emissions as well as prosperity, environment and biodiversity indicators. Kleespies says, "We found that these indicators substantially influence student perception in the respective country."

In response type 1, for example, climate change is underestimated as a driver. In countries with very high CO_2 emissions—such as Russia, China and Saudi Arabia—type 1 occurs far more frequently.

"Although our data cannot explain why this is the case, we suspect that the students in question in these countries are less aware. They do not learn at university that climate change, too, exacerbates biodiversity loss." Furthermore, it has to do with their own country's contribution to climate change. Perhaps people are not so ready to admit how extensive it is.

In response type 2—pollution as an underestimated factor—a correlation between the students' perception and country-specific indicators is also recognizable, but in a different form. In affluent countries with healthier ecosystems—such as Australia, Sweden and Germany—the students underestimate the pollution factor more frequently. Pollution is presumably not generally perceived as a problem in these countries, assumes Kleespies, and therefore also not seen to be one of the main causes of global biodiversity loss.

Response type 7, on the other hand, which greatly underestimates the influence of invasive species, is more widespread in countries such as Nigeria and Kenya, where such species are less common. In Australia and Spain, by contrast, type 7 is rare—although it is precisely there that invasive species present a major problem.

What conclusions does Kleespies draw from the study? "It shows for the first time the vast gaps in perception among the next generation of decision-makers in the environmental sector as far as biodiversity loss and its causes are concerned. We need to close these gaps."

This is where today's decision-makers at universities and in politics come into play. They must create the overall framework so that all the causes of this complex problem are treated in environmental studies at universities in the respective country.

"Biodiversity loss affects us all; it is a global problem. That is why students on environment-related degree programs need to think globally, regardless of their country of origin." The study is an appeal in this direction.

More information: Matthias Winfried Kleespies et al, Perceptions of biodiversity loss among future decision-makers in 37 countries, *npj Biodiversity* (2024). DOI: 10.1038/s44185-024-00057-3

Provided by Goethe University Frankfurt am Main