

# Dog feces and urine could be harming nature reserves, according to new study

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Sign at a nature reserve. Credit: Pieter De Frenne

New research finds that dogs being walked in nature reserves contribute a significant amount of nutrients to the environment through their feces

and urine, which researchers warn could negatively impact local biodiversity. The research is published in the British Ecological Society journal, *Ecological Solutions and Evidence*.

## **Significant levels of fertilization**

Researchers at Ghent University have estimated that each year dog feces and urine add an average of 11kg of [nitrogen](#) and 5kg of phosphorous per hectare to nature reserves near the Belgian city of Ghent. The researchers say that the nutrients added through this neglected form of fertilization are substantial and could be detrimental to biodiversity and ecosystem functioning.

The estimates for the amount of nitrogen being added by this previously unrecorded source are particularly significant when compared to the total levels of nitrogen being added across most of Europe through fossil fuel emissions and agriculture, which range from 5 to 25kg of nitrogen per hectare.

Professor Pieter De Frenne of Ghent University and lead author of the research said: "We were surprised by how high nutrient inputs from dogs could be. Atmospheric nitrogen inputs from agriculture, industry and traffic rightfully receive a lot of policy attention, but dogs are entirely neglected in this respect."

The researchers call for land managers, especially in low nutrient ecosystems, to emphasize the negative fertilization effects of dogs to visitors, encouraging them to remove their dogs' feces. They also call for leash use to be enforced more stringently and the establishment of more off-leash dog parks to reduce the pressure on nature reserves.

## **Dogs on leashes and owners removing feces have big**

## **impacts**

In the experiment, which calculated the amount of nutrients dogs were adding to the environment by recording the number of dogs present in four nature reserves, the researchers modeled different scenarios including if the dogs were on or off leashes and if owners picked up dog feces.

When the researchers modeled a scenario where all dogs were kept on leashes (legally required in all these reserves) they found that this reduced the fertilization rates in the largest part of the reserves but strongly increased fertilization rates in the small areas around paths. Over a year this input was as high as 175 kg of nitrogen and 73 kg of phosphorus per hectare.

Professor De Frenne said: "In our scenario where all dogs were kept on leashes, we found that in these concentrated areas around paths, nutrient inputs of both nitrogen and phosphorus exceeded legal limits for fertilization of agricultural land. Which is quite staggering as our study concerned nature reserves!"

In a scenario where dogs were on leashes, but all owners picked up their dogs' feces, the researchers found that this reduced fertilization levels by 56% for nitrogen and 97% for phosphorus. This is due to dog feces accounting for nearly all phosphorous being deposited whereas nitrogen is deposited equally by both feces and urine.

## **Increased nutrients a problem for nature reserves**

The addition of nutrients to nature reserves might sound beneficial as these lead to increased plant growth, however, this mostly occurs in a limited number of nutrient demanding species that outcompete rarer

specialists, reducing biodiversity.

"In many nature reserves, the management is specifically directed towards lowering soil nutrient levels to enhance plant and animal biodiversity. This can be done through methods like mowing and hay removal." Explains Professor De Frenne. "Our findings suggest that the currently neglected inputs of dogs in nature reserves could delay restoration goals."

## Calculating nutrient levels

To estimate the amount of nutrients dogs were adding to the environment, the researchers first calculated dog abundance per hectare, per year, by counting dogs in four nature reserves close to the city of Ghent, Belgium. These counts were performed on 487 occasions over 18 months. They then performed a literature search of nutrient concentrations in dog urine and feces to model different scenarios.

While this method meant that researchers could accurately calculate the abundance of dogs in the [nature reserves](#), estimations had to be made based on the average dog and average volumes of urine and mass of feces, as well as estimates of nitrogen and phosphorus concentrations.

The researchers say that their data could be improved by recording breeds of [dogs](#), as well as their size, weight and the number of urine and fecal deposits, for instance, by asking owners. The researchers also suggest that georeferencing dog feces and urine locations could further help to detect fertilization 'hot spots'.

**More information:** Pieter De Frenne et al, Nutrient fertilization by dogs in peri-urban ecosystems, *Ecological Solutions and Evidence* (2022).

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