Study finds new link between environment, urban diets

April 10 2015, by Michelle Schwartz

Urban diets can significantly influence the nutrients, like nitrogen and phosphorous, found in municipal waste streams.

What we eat has a big influence on our environment, in ways beyond the typical carbon footprint questions of local vs. imported or animal vs. vegetable.

An international team led by Arizona State University sustainability scientist Arianne Cease found that what we choose to eat – and what we excrete as waste – can influence the nutrient cycle on a large scale.

The elemetary school basics of the nutrient cycle are as follows: a plant

takes up nutrients from the soil and stores those nutrients in its leaves; then the leaves fall and are decomposed by bacteria, which release the nutrients back to the soil. If an animal eats the leaves, the nutrients will travel with the animal, eventually to be excreted perhaps some great distance from the plant.

Researchers of land and aquatic environments have found that animals can have strong effects on the ways that nutrients like nitrogen and phosphorus move through ecosystems.

Humans, too, can have profound effects on nutrient cycling. But humans have largely been left out of the research on consumer-driven nutrient cycling.

In a study published in *Oikos* on April 8, a team of five researchers from institutions around the U.S. and Sweden shows that urban diets can significantly influence the nutrients, like nitrogen and phosphorous, found in municipal waste streams.

A toxic imbalance

"Humans eat a variety of foods to get the nutrients they need," said Cease, lead author and an assistant professor in the School of Sustainability at ASU. "People may overeat one nutrient, such as phosphorous, to obtain adequate amounts of another."

Notably, phosphorous added to foods as a preservative could account for all of the excess phosphorous found in U.S. omnivore and vegetarian diets.

"This makes for an unhealthy diet for human kidneys and also leads to excess phosphorous in waste streams," Cease said.

A similar imbalance takes place in agriculture, when waste is recycled for use as fertilizer. Farmers fertilize according to the amount of nitrogen being applied to their crops, but as a result, they often apply more phosphorous than needed. That excess phosphorous can run off and enter the water supply.

When there is an imbalance of nutrients like nitrogen and phosphorous entering bodies of water, it can cause toxic algal blooms.

"These algal blooms can contaminate drinking water and reduce water clarity, oxygen levels and biodiversity," said Michelle McCrackin, a researcher at Stockholm University (Sweden) and a member of Cease's team.

Toxic algal blooms aren't the only concern. Phosphorous is a valuable, but limited, resource, necessary to food systems worldwide. Related research at ASU addresses sustainable phosphorous.

A positive influence

Fortunately, one of the Cease team's key findings is that people can have a positive influence on the balance of nutrients entering bodies of water.

"Upgrading waste treatment facilities to remove more nitrogen and phosphorus from human waste could substantially reduce water pollution," said Kiza Gates, a postdoctoral researcher at the Oklahoma Biological Survey.

"The Oikos study showed that new ways of recycling nutrients to fertilize crops – managing nitrogen and phosphorous simultaneously – are also critical," added Daniel Nidzgorski, a postdoctoral researcher at the University of Minnesota. "In our study, we're challenging the idea that 'human activities' and 'natural processes' are separate things."

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Provided by Arizona State University

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