



Guano: it's the smell of money. Photo by Lisa Strachan/Alamy Stock Photo

Banking on Bird Shit

Bird feces contribute nutrient-rich fertilizer to ecosystems. Harvesting them has also been a big business for centuries.

by [Lina Zeldovich](#)

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Almost everyone, at some point in their life, has had a bird poop on their head. It's gross. But it can also be taken as good luck, particularly if it's a seabird splat—that shit is worth serious money.

Farmers in South America and a few other places have long used the nutrient-rich substance, called guano, as fertilizer. And it turns out that seabirds excrete up to almost US \$474-million worth of the stuff per year worldwide, according to a new study. The authors see this finding as a perfect public relations opportunity for seabird services.

“We wanted to inform the general public about the importance of seabirds and the value they provide for humans,” says Daniel Plazas Jimenez, a PhD candidate at the Federal University of Goiás in Brazil who

studies food chains and coauthored the paper, published [in *Trends in Ecology & Evolution*](#). But the value that seabirds provide to world ecosystems is much greater, Jimenez adds—a powerful argument for seabird preservation.

Species like gulls and pelicans nest on islands along the Peruvian and Chilean coasts, mounding the rocks with their droppings. A lot of this guano stays in place due to the region's extremely arid climate, so the droppings attract local harvesters who scrape it off with shovels and sell it as organic fertilizer to farmers. But some guano flushes into the sea, depositing phosphorus and nitrogen. These chemical elements fuel the growth of phytoplankton, which feeds a variety of marine species, from snails to fish that humans eat.

When this guano deposition occurs near coral reefs, it can boost the reefs' fish stocks by up to 48 percent. According to a 2016 estimate from the United Nations World Ocean Assessment, the annual net global economic return of commercial fisheries on coral reefs is [\\$6.8-billion](#). If just 10 percent of coral reefs' fish stocks depend on guano nutrients—a conservative estimate, according to the Brazilian team—that's \$650-million a year. Combined with seabirds' annual fertilizer output, that adds up to over a billion dollars.

The Goiás scientists are only the latest in a long line of people who have prized bird poop. The ancient civilizations that lived along the South American Pacific coast used guano for agriculture for over 4,000 years, says ornithologist Pedro Rodrigues, who [wrote a paper on the subject](#). The Inca, for example, harvested guano with boats, then carried it up to farmlands in the Andes on llama caravans—all the way up to Machu Picchu. One of the Inca's much-venerated goddesses was Urpi Huachac, "the Lady of Guano."

Conscious of the importance of guano to the food security of their growing empire, the Inca developed strict policies protecting the birds that produce the guano and governing its distribution. Some of these policies banned people from landing on guano islands during breeding season and from stealing eggs. Anyone who killed the birds or disturbed their nests faced death. "Due to the value that guano had to the Incas, I have no doubt that the penal code was strictly enforced," Rodrigues says.

Other policies divided guano equitably between different provinces, taking into account the needs of each, along with the size of the islands, and implementing measures to prevent overharvest, Rodrigues says. Essentially, the Inca implemented early conservation laws to make their fertilizer a sustainable, renewable resource.



Bird poop is a valuable fertilizer and islands like these have been coveted by various countries since the 18th century. Photo by Buiten-Beeld/Alamy Stock Photo

When Europeans realized that guano could boost their crop yields, it became a hot commodity on that continent, too. Between 1840 and 1880, Peru exported an estimated 11.5 million tonnes of guano from its islands, making about \$13-billion in today's currency, [according to a paper written](#) by University of Kansas environmental historian Gregory T. Cushman. Guano was so valuable at the time that US president Millard Fillmore, during his 1850 State of the Union address, said his government should “employ all the means properly in its power” to get it.

Not long after, the US Congress [passed the Guano Islands Act of 1856](#), empowering the nation's citizens to scrape the birds' bounty off uninhabited islands, cays, and rocks around the world—with little regard to the local people who may have relied on it—and sell it back home. Within a few years, the United States had claimed nearly 200 guano islands and mobilized its navy to guard them. Today, it still has ownership of nine.

Swashbuckling Spaniards, meanwhile, used guano islands for political and economic leverage. In 1864, Spain seized Peru's guano-covered Chincha Islands and held them "hostage" for a hefty ransom. Given its economic dependence on guano, Peru had little choice but to pay.

The guano wars finally came to an end in the early 20th century, when German scientists Fritz Haber and Carl Bosch developed [a method to synthesize fertilizer](#). Using high temperatures and pressures, they fused nitrogen from the air with hydrogen from natural gas, creating ammonia, a form of nitrogen that plants can absorb through their roots. The process was efficient, though it polluted the environment and ended widespread dependence on seabirds, as well as the lucrative guano export markets of Peru and Chile.

Today, organic farming has brought guano back to the agricultural forefront, says Rodrigues. Throughout history, humans have used various animals' poop—including their own—to fertilize their fields. But the giant mounds adorning the islands on the South American Pacific coast represent a unique environment. "For thousands or even millions of years the birds have been nesting there," says Rodrigues. "They have meters of guano in these places."

Threatened and endangered bird species deposit a lot of these riches. As bird populations drop, so will their fertilizing power, points out Jimenez, of the Goiás team. "These contributions will decrease in the future if no conservation activity is taken."

So the next time a bird unloads on you, keep in mind that it's a contribution to Earth's ecosystems—a gift, perhaps, from Urpi Huachac herself.

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[Lina Zeldovich grew up in a family of Russian scientists, listening to bedtime stories about volcanoes and black holes. She has written for the *New York Times*, *Scientific American*, *Reader's Digest*, and other publications and has won four awards for covering the science of poop. Her book, *The Other Dark Matter: The Science and Business of Turning Waste into Wealth*, will be released in October 2021 by Chicago University Press.](#)


