

H P L

# BLOG POST

## BIRDS AS NATURE'S BAROMETERS



By Natalia Velázquez, Associate at HPL  
May 28th, 2025

Birds are commonly known as "barometers of the environment" because they provide valuable insights into the health and sustainability of ecosystems. As highly sensitive creatures, birds respond to changes in their environments, such as habitat loss, climate change, pollution, and shifts in food supply.[1] They serve as crucial indicators for monitoring the well-being of ecosystems, offering not only a reflection of environmental health but also the early warning signs of potential ecological disruptions. In fact, birds provide us with many different "ecosystem services". They can act as pollinators; nectar-feeding birds such as hummingbirds, enable seed fertilization as they move pollen from flower to flower. Many birds are also considered keystone species, as their presence or disappearance affects an ecosystem balance, including influencing the sustainable population levels of other species.[2]

## WHY ARE BIRDS EFFECTIVE ECOSYSTEM INDICATORS

---

Birds are considered "indicator species", as they provide information on the state of the ecosystem and the species that inhabit them. For instance, by monitoring bird populations, scientists can track the evolution and health of ecosystems, such as the development of early-seral forest communities, which is the initial stage of forest development and recovery after a disturbing event such as a wildfire or disease.[3]

One of the reasons birds are effective bioindicators is their sensitivity to changes in the environment. Birds rely on specific habitats and conditions for breeding, feeding and migration, making them highly responsive to shifts in availability of food, pollution levels, and temperature. [4] Consequently, changes in their behavior including breeding and migration, present early warnings on the effects of climate change and human activity. For example, a decline in insect-eating bird populations can be associated with intensive use of pesticides or loss of insects, which then can lead to further inquiries on the causes of such declines.[5]

Furthermore, migratory birds provide crucial information on the environmental conditions of diverse areas across regions and continents. It has been seen that, due to changes in climate conditions and warming temperatures, migration and breeding timings have evolved. Temperature, precipitation and food supply influence breeding behavior.[6] Many birds are migrating earlier to their breeding areas due to higher temperatures, causing a disruption on the ecosystems' balance and food availability. Hence, affecting egg-laying conditions and breeding success rates.[7]

## CASE STUDIES: BIRDS AS LIVING SENTINELS OF ECOSYSTEM HEALTH

---

There are numerous existing examples in which birds have been studied to track and understand the effects of climate change in specific environments. Below are two representative examples.

### ***Penguins as Bioindicators of Environmental Pollutants***

Penguins have been studied to assess mercury contamination across different mercury hotspots in the Southern Hemisphere, such as Australia, Antarctica, and Tierra del Fuego. Mercury is a persistent pollutant that enters the environment through both natural processes and human activity. It threatens the health of marine ecosystems due to their bioaccumulation and biomagnification capabilities, meaning that it concentrates in living organisms.[8] To assess and monitor mercury contamination, penguins are considered effective bioindicators: mercury is absorbed and distributed throughout the entire organism of these birds, it is incorporated into their bloods and feathers.[9]

Research has shown that mercury contamination is closely linked to global warming. Penguin feathers can present up to 80-100% of mercury, particularly in the form of methylmercury, which allows the detection of mercury levels.[10] Increasing temperatures due to global warming heighten mercury atmospheric concentrations, which subsequently raises the risks to wildlife, including penguins. By studying mercury levels in penguin populations, researchers gain valuable insights into the broader environmental health of marine ecosystems, supporting the implementation of preventative measures to mitigate the impact and presence of this pollutant.

### ***Flamingos and their Role in Wetlands' Health***

Flamingos contribute to the microbial purification and denitrification in saline wetlands. Through their feeding habits and particular way of walking, flamingos stir up sediment and enhance microbial activity in the water. This enhanced microbial production helps purify organic matter in wetlands.[11] In addition, flamingos' behavior and nutrient content in their droppings contribute to denitrification, which is the process of reducing the amount of nitrogen in the water. Denitrification preserves water quality and prevents the accumulation of nitrates, which could be harmful to the ecosystem's health.[12]

In addition, flamingos are also highly dependent on water availability in wetlands. During dry seasons, the flamingo population decreases, and the presence of nutrients such as phosphorus and microbial production decrease as well.[13] Therefore, flamingos play a crucial part in the functioning and well-being of saline wetlands, and conservation efforts to protect them are essential for the long-term health of these environments.

Bird monitoring programs have become an essential part of global conservation efforts. Numerous organizations, including BirdLife International and the National Audubon Society, are at the forefront of these initiatives. These organizations design, fund, and implement bird monitoring programs that collect and analyze data on bird populations. Through such initiatives, researchers can track shifts in bird behaviors and collect valuable information on the overall health of ecosystems.

Birds are much more than just beautiful colored creatures or melodists. They are sentinels of ecosystem health, offering us first-hand insights into the well-being of the natural world. As we face increasing effects of climate change, it is essential that we continue monitoring birds and protecting their habitats, which will also help preserve the delicate balance and ecological health of ecosystems we live in.



**HPL.LLC | [hplllc.com](http://hplllc.com) | [Our Services](#)**

## REFERENCES

- [1] Avian Report (n.d.). Birds as Indicators of Ecosystem Health. Available [here](#).
- [2] Ibid.
- [3] Forest and Rangeland Ecosystem Science Center for US Geological Survey (2022). Birds as Indicators of Ecosystem Health. Available [here](#).
- [4] Angela Onyango (2024). Birds are nature's indicator of a healthy environment. Available [here](#).
- [5] Avian Report (n.d.). Birds as Indicators of Ecosystem Health. Available [here](#).
- [6] Wolfgang Fiedler (2009). Bird Ecology as an Indicator of Climate and Global Change. Not available online.
- [7] Angela Onyango (2024). Birds are nature's indicator of a healthy environment. Available [here](#).
- [8] Míriam Gimeno et al. (2024). Assessing mercury contamination in Southern Hemisphere marine ecosystems: The role of penguins as effective bioindicators. Available [here](#).
- [9] Miguel Motas et al. (2021). Mercury Levels in Feathers of Penguins from the Antarctic Peninsula Area: Geographical and Inter-Specific Differences. Available [here](#).
- [10] Ibid.
- [11] Germán Portillo (nd.). Flamingos, natural allies in the purification of saline wetlands. Available [here](#).
- [12] Gema L. Batanero et al. (2017). Flamingos and drought as drivers of nutrients and microbial dynamics in a saline lake. Available [here](#).
- [13] Ibid.

## AUTHOR

**Natalia Velázquez** is an Associate at HPL, graduated with a Bachelor's Degree in International Relations from the Instituto Tecnológico Autónomo de México (ITAM). In HPL, she has supported 19 consultancy projects related to sustainable finance research, market guidance development, and the preparation and structuring of thematic bonds for development banks, commercial banks, and corporates in LAC. Natalia has also contributed to the execution of sustainable finance studies for multilateral development banks and international organizations.

## ABOUT HPL

HPL is a dedicated consulting firm that strongly recognizes the significance of sustainable financing in mobilizing resources for the betterment of society and the environment. Our specialized services are designed to accelerate capital flows towards sustainable initiatives.

If you're looking to elevate your organization to the next level in sustainable finance, or if you're interested in issuing a green, social, or sustainability-linked bond, our expert team is here to provide you with guidance and assistance every step of the way. You can reach out to us through LinkedIn, email, or our website to explore the comprehensive services we offer. Together, we can embark on a path towards making a meaningful contribution to the global sustainability agenda. HPL has developed user-friendly methodologies and tools to help their clients assess compliance with international climate finance taxonomies and adopt international methodologies to measure financed emissions. HPL has designed the HPL CAT (Carbon Accounting Tool), which aims to enhance clients' ability to track financed emissions of scope 3 (category 15). This tool focuses on improving the quality of data related to greenhouse gas emissions. HPL CAT offers a detailed and personalized approach for each client, helping them set realistic and achievable goals and develop action plans that facilitate an orderly and effective transition to a low-carbon economy.

## DISCLAIMER

This blog post was prepared by HPL.LLC. The content of this blog post is based on research conducted through desktop studies by HPL. The information provided herein should be used for informational purposes only and should not be considered as professional advice.