



Why does a sea otter matter to a kelp forest? Why does a wolf matter to a river? Why does an obscure beetle matter to a rainforest? Every species on Earth is part of a web of relationships so complex that removing even a single thread can cause the entire fabric to shift. This guide explores biodiversity, ecosystem services, and why the health of wildlife is inseparable from the health of people.

■ What Is Biodiversity?

Biodiversity — short for **biological diversity** — refers to the variety of life on Earth at every level of organization. Scientists recognize three interconnected dimensions:

Species Diversity	The variety of different species in a region or on Earth. Currently about 8.7 million species are estimated to exist; only ~2 million have been formally described.
Genetic Diversity	Variation in genes within and between populations. Genetic diversity determines a species' ability to adapt to environmental change and disease.
Ecosystem Diversity	The range of habitats, biological communities, and ecological processes present in an area — from coral reefs to tundra to urban parks.

■ Ecosystem Services

Ecosystems are not simply scenic — they provide services essential to human survival. Economists estimate these services are worth trillions of dollars annually, yet most are provided for free by the natural world. The Millennium Ecosystem Assessment (2005) categorized them into four pillars:

Category	What It Includes	Example
Provisioning Services	Food, clean water, timber, fiber, medicinal compounds	Wild fisheries feed ~3.3 billion people; 25% of medicines derive from tropical plants
Regulating Services	Climate regulation, water purification, flood control, disease control, pollination	Bees and other pollinators support ~35% of global food production by volume
Cultural Services	Recreation, spiritual value, aesthetic beauty, ecotourism, scientific knowledge	Global ecotourism generates over \$600 billion annually, much supporting conservation
Supporting Services	Nutrient cycling, soil formation, oxygen production, habitat	Phytoplankton produce ~50% of the oxygen in Earth's atmosphere

■ ■ The Biodiversity Crisis

Earth is currently experiencing what scientists call the **Sixth Mass Extinction** — the first driven by a single species: *Homo sapiens*. The background rate of extinction (the natural rate before human influence) is estimated at 1–5 species per year. Today's rate is estimated to be **100 to 1,000 times higher**.



The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) 2019 Global Assessment reported that approximately **1 million species are currently threatened with extinction** — many within decades. About 40% of amphibian species, 33% of reef-forming corals, and over 10% of all insect species face threat.

■ Why Every Species Matters

Ecologist Paul Ehrlich compared ecosystems to an airplane held together by rivets. Removing one rivet (species) may have no immediate effect — but remove enough, and the airplane falls apart. This "rivet hypothesis" captures the danger of cumulative species loss even when individual losses seem inconsequential.

Beyond this, many species play **keystone roles** — their removal has outsized, cascading effects on entire ecosystems (see WLD_02: Ecosystem Fundamentals). The loss of wolves from Yellowstone changed river courses. The loss of sea otters collapsed kelp forests. The loss of vultures in South Asia triggered disease outbreaks in humans and wildlife alike.

■ Wildlife and Human Health

The natural world has been humanity's pharmacy for millennia. Aspirin derives from willow bark. Penicillin from mold. Taxol (a front-line cancer drug) from Pacific Yew trees. ACE inhibitors for hypertension from pit viper venom. Ziconotide for chronic pain from cone snail toxin. Scientists estimate that fewer than 2% of known species have been screened for pharmaceutical potential — the untested 98% represents an irreplaceable library that disappears with every extinction.

Additionally, research consistently links time in nature with reduced cortisol, lower blood pressure, improved immune function, and better mental health outcomes. The economic value of urban green space to public health is now well-documented in peer-reviewed literature.

■ **One Health Connection:** The health of wildlife, domestic animals, people, and ecosystems is inseparable. This is the foundation of the One Health framework — a global approach recognizing that addressing threats to biodiversity is also addressing threats to human and animal health. Xavier's Veterinary Care embraces One Health principles in every aspect of our practice.



■ Final Summary

Biodiversity is not a luxury — it is the foundation of clean water, clean air, food security, disease regulation, and medical discovery. Every species lost represents an irreplaceable piece of the planetary web that sustains all life, including our own. Understanding this is the first step toward meaningful conservation action.

■ Related XVC Guides:

- [WLD_02: Ecosystem Fundamentals](#)
- [WLD_05: The Extinction Crisis](#)
- [WLD_23: How You Can Help](#)



This resource may be shared for personal, educational, or non-commercial use provided it remains unmodified and Xavier's Veterinary Care is credited as the original source. Commercial reproduction or resale without written permission is prohibited. For diagnosis & prescriptions, consult a licensed veterinarian.
© 2026 Xavier's Veterinary Care.