Shared Outcomes for Birds and People: Relevancy Toolkit 2.0

The natural world around us is shaped by many factors, including birds. We admire birds for their beauty, songs, and amazing ability to fly, but they're also important to a functioning ecosystem. Birds convey signals about the world around us, such as the effects of pollution, climate and weather trends, and different types of land use. They keep insects and other pests in check, and they impact our food and drink, our health, and our wallets. The research summarized below offers a few examples of how humans and birds need each other, and how protecting what's good for people is good for birds, and vice versa.

High Quality Bird Habitat is Linked to Human Health

It has been demonstrated that the protection of wildlife habitat, combined with reducing human pressures on wildlife, can keep both animals and people healthier, and that the loss of wildlife habitat directly leads to an increase in infectious diseases.

Coronavirus patients in areas of the U.S. with high air pollution levels are more likely to die from the disease than patients in cleaner parts of the country. In an analysis of 3,080 counties, researchers found that higher levels of the tiny, dangerous particles in air known as PM 2.5 were associated with higher death rates from the disease. Forests are great natural air filters, providing cleaner air, which can help protect human health. It has even been demonstrated that loss of biodiversity and wildlife habitat directly leads to an increase in infectious diseases.

Protection of wetlands reduces the spread of avian influenza. Researchers have found that protecting natural areas such as wetlands reduces the spread of the disease among poultry, but also to humans because having natural areas increases the segregation of domestic and wild stocks.

Access to nature is important to the health of people living in urban areas. Experiencing wildness is particularly important for physical and mental health, according to a study by researchers at the University of Washington. Past research has found health and wellness benefits of nature for humans, but this is the first study to show that pockets of wildness within urban areas is profoundly important for human well-being. Another recent study demonstrated the psychological and mental health benefits of exposure to natural outdoor environments in four major European cities.

Bird song makes us happier and more productive. Several recent studies have shown that listening to bird songs and calls can improve a person's mood and attention.

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Birds control pests that cause human diseases. Rodents and insects carry diseases or hosts that transmit illnesses such as plague, malaria, dengue fever, and dozens of others. Insectivorous birds, hawks, and other birds of prey help keep a number of human diseases in check by consuming the rodents or insects. On Guam, which has very few native birds, the density of spiders is up to 40 times greater than Saipan, an island with a relatively intact bird community. Seed dispersal of native plants is also much higher on Saipan compared to Guam.

Birds are natural barometers. When wild bird populations decline, it's often an indication of pollutant or contamination problems that trigger human health issues. Declines in American robins, waterfowl, pelicans, and birds of prey were some of the first clues about the dangers of contamination from heavy metals and DDT. Rachel Carson's classic book Silent Spring referred to the loss of birds – from the same causes that were greatly impacting human health.

The Economic Benefits of Bird Conservation

The economic benefits of protecting earth's land and water outweigh the costs by 5-to-1. In the most comprehensive report to date on the economic implications of protecting nature, over 100 economists and scientists found that the global economy would benefit from the establishment of more protected areas. The report offers new evidence that the nature conservation sector drives economic growth, delivers key non-monetary benefits and is a net contributor to a resilient global economy.

Bird watching generates billions in economic activity. About 46 million people in the U.S., nearly one in five adults, watch birds, spending about $40 billion annually and creating more than 860,000 jobs. With associated and spin-off benefits, bird-watching is a $107-billion-in-dustry that positively impacts 47 million people per year.

Nearly 5 million **Californians** go bird watching each year, generating $3.8 billion dollars in economic impact. In **Pennsylvania**, a rare Black-backed Oriole sighting attracted nearly 2,000 visitors. Researchers estimated the economic impact at $218,000 for hotels, restaurants, and other services. **Louisiana** generates nearly $1 billion per year through wildlife viewing, positively affecting over 14,000 jobs.

Bird hunting generates billions in economic activity. Nearly 14 million people hunt each year in the U.S., spending $38 billion on all species ($6.5 billion for bird hunting) for travel, equipment, licenses, and other costs. Total economic activity related to hunting is nearly $100 billion. Healthy populations of a single species can generate as much as $26 million annually. Hunters and wildlife watchers of the charismatic Northern Pintail on its wintering grounds spend money on area hotels, restaurants, sporting goods stores, gas stations, and many other local businesses.

Ducks Unlimited Canada has produced a thorough study that answers the question: How does land conservation contribute to Canada's economic and societal well-being?

National wildlife refuges are economic engines. The first refuge, Pelican Island, **Florida,** was established to protect egrets and other birds. Refuges now encompass 150 million acres, exist in every U.S. state and territory, and attract 50 million visitors per year, generating 35,000 jobs and $2.4 billion for local economies.

Natural Areas Generate an Economic Premium

Protected habitat and the birds using it enhance property values. In one study, researchers found that the presence of birds and greenspace increased property values as much as $32,000, and that more bird species were correlated with higher property values. Even the presence of a single uncommon species raised prices. Researchers in **Massachusetts** found that property located closer to a popular bird-watching spot generated a significant property value premium. Other studies have shown that open space may result in 5-35% higher prices for nearby homes and 13-14% greater appreciation rates than regional averages.

Conservation land benefits taxpayers. Conserved land is less expensive for communities to maintain than developed areas, as undeveloped spaces require fewer municipal services such as road maintenance, education, trash collection, and public safety. Across **New England,** 39 separate studies demonstrated that the average undeveloped parcel requires $0.36 in municipal services for every $1.00 of property tax paid, while residential properties require $1.16. Long-term studies in Vermont suggest that land conservation results in stable or even lower tax rates due to the increase in value of parcels adjacent to conservation land.

Conserved land boosts jobs. A recent study analyzing 1,500 **New England** cities found that when conservation increased, employment did, too. Public access to undeveloped lands can spur tourism and grow local economies. The Kingdom Trails mountain bike area in East Burke, Vermont, has attracted a new type of tourism to the region, generating $1,000 per conserved acre each year in local economic benefits, in addition to $135 per acre in annual timber revenues. Habitat management and wildlife-associated recreation contributed $53.4 million to the Merced County, **California** economy and accounted for about 1,100 jobs.

Protected areas around lakes, streams, and rivers are good for the economy and provide bird habitat. In 2016, the Kittatinny Coalition in **Pennsylvania** completed a Return on Environment Study for Dauphin County, the source of water for the state capital, Harrisburg. They found that the benefits for stormwater mitigation, nutrient uptake, groundwater recharge, pollination, erosion prevention, and carbon sequestration totaled over $20 million per year.

Wetlands provide as much as $3,273 per acre per year of total economic value via flood control, water treatment, climate regulation, raw materials, hunting, fishing, and other forms of recreation.

The USDA Sodsaver program is a money saver. By leaving more prairie uncultivated for wildlife, the savings to taxpayers in reduced federal crop insurance payouts is expected to be $1.4 billion over 10 years.

Natural Areas Provide Clean Air and Water

The most cost-effective means of providing clean water is protecting land around rivers, lakes and streams. Maintaining clean, safe drinking water can be expensive. Costs for developing a new filtration plant for **New York** City was estimated at $6-8 billion, with $100 million in annual operating costs. Instead, the city chose to protect land around rivers, lakes, and streams to protect water for half the state's population. This program also provides camping, hunting, and fishing opportunities, and saves billions of dollars for rate water users.

Protecting watersheds cleans water and saves money. The town of Gorham, **New Hampshire** purchased and protected a local forest to ensure the supply and quality of their municipal water, reducing expenses which

would have been incurred through filtration costs. Timber sales also net $40,000 each year in revenue, which has been reinvested by helping expand their fire station and emergency services.

The Conservation Reserve Program provides clean soil and more water. CRP dollars show a 300%+ return in flood mitigation, clean drinking water, and clean water for fishing, boating, and swimming – all while improving bird habitat.

Healthy forests clean our air and water. Clark's Nutcrackers provide no-cost seed dispersal. The estimated investment needed to replace this species' seed dispersal of whitebark pine is as much as $1,000 per acre, or about $13.9 billion across the range of whitebark pine in the U.S.

Agricultural and Timber Producers Benefit from Birds

Birds protect important crops. In a study conducted in major agricultural production regions of **Michigan and Wisconsin**, farms that provided healthy grassland habitat realized a 30 per cent increase in the predation of the eggs of crop pests.

Natural habitats such as riparian areas and forest edges can reduce agricultural pests. These habitats led to a better aphid control, partly through foraging by birds, with overall beneficial results for growers. In studies on cabbage, birds reduced more aphids in non-sprayed fields with higher abundance of the pests than in sprayed fields; and reduced pest caterpillars by 49%. And while birds don't necessarily like kale, but they love kale pests. In two separate studies, birds were beneficial in reducing caterpillars when natural habitat was available nearby.

Birds protect valuable timber and reduce the need for insecticides, mitigating damage on spruce trees by reducing spruce budworm outbreaks and producing control levels comparable to insecticides. In **Washington**, avian control of spruce budworm is worth at least $570 per square mile per year.

Of the 10,000+ species of birds in the world, about 5,700 consume insects. Just how many bugs is that? A Swiss ecologist calculated the total at 500 million tons per year.

Birds protect economically-important forests. The global value of services and products from the world's temperate and boreal forests is estimated at $1.385 trillion annually,about $90 billion in the U.S. Birds play a vital role in keeping this resource healthy, by controlling insect pests and dispersing seeds.

Birds play a key role in reducing damage to trees and crops. Many studies have shown that reducing or excluding birds increases insects and leaf damage to trees. Bark-foraging birds may slow the spread of lethal pests -- in some cases, equal as much as pesticides, but without the negative side effects.

Birds control insect and rodent pests and damage to crops in working farms and ranches growing apples, corn, broccoli, kale, cacao, coffee, oil palm, grapes, rice, alfalfa, wheat, clover, oats, and dates – crops collectively worth billions of dollars per year in the U.S. and elsewhere.

Bird habitat near vineyards may increase grape harvests. Researchers found that birds can respond quickly to simulated pest outbreaks, and can consume up to 90% of harmful insect larvae. Rodents may also be deterred from damaging crops by the presence of birds. When challenged by the threat of avian predation, a rodent pest species spent less time foraging and less time damaging crops.

Wetlands provide crop producers with extra income. Those that invest in improvements on their property often see financial returns from waterfowl hunting leases. More than 50% of **Oregon** farmers with waterfowl habitat enjoyed this privilege.

Good farming practices in rice production can benefit birds. Rice is one of the world's most important crops, and certified rice -- that grown in shallow water that attracts birds -- can increase income to producers. An annual festival in **Louisiana** allows birdwatchers ride on rice harvesting machines to watch flushed birds.

2,000 species of birds play a role in flower pollination. About 4% plant species in the world are pollinated by birds, including White-winged Dove which are important pollinators of saguaro cactus, a big eco-tourism force in **Arizona**. Crops such as banana, papaya, and nutmeg are pollinated mainly by birds.

Fruit- and seed-eating birds disperse seeds of 70,000 plant species – about 25% of all species with seeds. Birds disperse seeds much more widely than insects, mammals, or wind. Waterbirds disperse the seeds of wetland plants over great distances into favorable areas or unconnected sites, increasing plant diversity.

Protecting Coastlines and Wetlands Benefits People and Birds

Coastal wetlands and estuaries provide protection to roads, buildings, and public works experiencing major weather events. Hurricane Sandy in 2012 caused $70 billion in property damage. Loss of 1 acre of coastal wetlands corresponds to an average increase in storm damage of $13,000. Coastal wetlands provide up to $23.2 billion per year in storm protection services in the U.S.

Coastal forests reduce storm surge and saltwater intrusion. Protected coastal habitats are crucial for ensuring longevity of our communities, where they also bolster the resilience of migratory bird populations that rely on these forests as stopover sites during migration.

Allowing water and sediment to flow freely into coast marshes protects communities and helps birds. Allowing free tidal flow and the associated sediment into marshes is imperative for maintaining coastal resilience against extreme storm events and mitigating the effects of climate change. Studies also indicate that allowing these natural processes helps birds that depend on this specialized ecosystem.

Protected Louisiana coast provides economic benefits. **Louisiana** has lost 2,000 square miles of coastal land since the 1930's. Recent protection projects benefitted 36,000 acres and more than 60 miles of barrier islands. Protecting habitat for birds also protected private land, roads, buildings, and public property.

Saltmarsh habitat, which is great for birds, is an important economic resource. More than 2/3 of the U.S. commercial fish catch, valued at more than $16 billion, is comprised of fish dependent on estuaries.

Conservation lands store billions of gallons of water. Conservation Reserve and Wetland Reserve lands in the Prairie Pothole Region reduced soil loss by 2 million tons per year (valued at $7 million) while providing important bird habitat.

Examples from Around the World

Ecotourism, much of it in the form of birdwatching, generates nearly $2 billion for **Costa Rica** every year, and creates thousands of jobs. It is the country's top source of foreign capital, and accounts for more than 7% of the country's total Gross Domestic Product.

Migratory birds are an important control on the coffee berry borer, the world's primary coffee pest. Coffee plants that don't provide access to foraging birds have significantly higher damage than other plants. In **Costa Rica**, birds reduce this beetle's infestation by about 50% and prevent $30–$122 per acre per year in damage -- a benefit per plantation on par with the average annual income of a Costa Rican citizen. Birds also control coffee insect pests and increase harvest value in **Jamaica,** valued at about $122 per acre per year, equal to 10% of the per capita gross national income. Many wood warblers which nests in the **U.S.** and **Canada** and winter in Central America, eat coffee-boring beetles. Payments to landowners for protecting forests provide an incentive to conserve habitat and protect warblers.

Bird Watching in Turkey generates significant economic value. The recreational value of one national park in **Turkey** was estimated at $103M per year.

Eurasian Jays are forest restorers. Researchers in **Sweden** estimated the cost of replacing seed dispersal services by jays of economically and ecologically important trees with human methods to be between $4,900-$22,500 per pair of jays.

Falcons control vineyard pests in **New Zealand** where they are associated with a 55% reduction in the grape destruction by other birds. One falcon could potentially result in savings of up to $50 USD per acre.

In **Spain** and **India**, vultures save people money and reduce disease. Without vultures, the carcasses of free-ranging livestock must be disposed of professionally, which costs money and which also involves an incineration that emits about 77 tons of carbon. The disappearance of vultures in **India** led to 48,000 human deaths from rabies and cost $34 billion to the economy. Scavengers such as feral dogs, which may carry rabies, and rats, which may carry bubonic plague and other diseases, have also increased. The potential human health impact was estimated at $2.4 billion. Other studies have shown the value of vultures in lowering disease transmission to and among humans.

Protecting mangroves reduces pollution and poverty. Protecting habitats such as mangrove swamps has reduced pollution, boosted economic activity, and reduced poverty by providing a sustainable, local fishery, along with critical bird habitat. Mangroves also sequester carbon and protect coasts while providing habitat for hundreds of bird species.

Additional Resources and Review Studies

In the 2016 book Why Birds Matter, an international team of ornithologists, botanists, ecologists, conservation biologists, and environmental economists quantifies avian ecosystem services—the myriad benefits that birds provide to humans. Some of this material is available in an earlier review article by some of the same authors. Several other articles summarize the services that birds provide to humans. A summary of hundreds of published studies summarizes the ecological functions and general services provided by birds to humans.

Another provides a comparison of the pollination, seed dispersal, and pest control provided by tropical bird species that prefer forests, agricultural areas or both.

A review article on predation of birds on agricultural pests in several types of tropical ecosystems concluded that functional group richness – the more kinds of birds the better --- was the best predictor of insect reduction.

Several authors examined the literature on bird benefits to humans in urban environments, and drew conclusions about the best management practices. One finding was that urban forests and parks can be improved by including informal and uncultivated green space in management plans to provide favorable habitats for city birds.

Birds and nature keep us healthy in a variety of ways. One large review study of hundreds of articles identified 21 medical pathways from nature to health. Each pathway empirically supported the link between contact with nature and specific health outcomes such as reduced blood pressure, elevated auto-immune systems, and reduced stress.

The Wild Farm Alliance helps producers benefit from and support natural areas while producing healthy food. They have summarized more than 600 scientific studies showing the benefits of birds to many forms of agriculture in the U.S. and around the world.

Researchers from National Audubon Society and the University of Illinois have compiled an impressive summary of examples of the services that birds in Neotropics supply, such as pollination, seed dispersal, nutrient cycling, and cultural services.

Several comprehensive studies have been published about the effects of air pollution, water pollution and general environmental pollution on human health and the environment, with significant sections devoted to the effects on birds and other wildlife.

The U.S. North American Bird Conservation Initiative (NABCI) Committee is a partnership of state and federal agencies and private organizations in the U.S. working to ensure the long-term health of North America's native bird populations and their habitats. The vision of the committee is that healthy and abundant populations of North American birds are valued by future generations and sustained by habitats that benefit birds and people. Through NABCI, public, private, and non-profit organizations work to address shared conservation challenges and priorities. NABCI also collaborates with its counterparts in Canada and Mexico to ensure that this hemispheric shared resource is fully protected.

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