

The Human Connection

*by Nancy Lange, Izaak Walton League of America, and Arpita Choudhury,
Association of Fish and Wildlife Agencies*

America's Legacy of Wildlife and Wild Places

Our country is blessed with an abundance of lands of unsurpassed beauty and inestimable value. From mountains and forests to prairies and wetlands, these treasures enrich us as a nation and inspire us as a people. They are the foundation of our economic well-being, an essential component of our quality of life and a legacy we hold in trust for future generations.

Today, climate change poses an unparalleled threat to these lands and the people, fish and wildlife they support. If we are to pass America's rich natural heritage on to our children, we must be good stewards of our wildlife and wild places in this time of great challenge.

Overheating the Planet

Concentrations of heat-trapping gases in the atmosphere are at their highest levels in at least 800,000 years. During the 20th century, average global temperatures rose by more than one degree Fahrenheit (F), and scientists project that without explicit climate protection policies to reduce greenhouse gas emissions, temperatures will rise another two to 11 degrees F by 2100.¹ Even if greenhouse gas emissions were stabilized immediately, the long lifetime of carbon dioxide in the atmosphere and the vast heat storage capacity of the oceans will fuel climate change beyond 2100. Earth cannot escape experiencing the consequences of climate change, some of which are already alarmingly evident.

Climate change is displacing ecosystems

Northern and arctic regions are warming at an accelerated rate, and ecosystems are on the move. Boreal forests are retreating to more northerly latitudes and may be replaced by grasslands or deciduous

¹ Intergovernmental Panel on Climate Change (IPCC).

temperate forests. Alpine systems are moving upslope. Across the globe, ranges of wildlife and plant species are shifting northward and to higher elevations.

Climate change is melting Earth's ice

Winter ice cover on lakes is declining in duration and thickness, and summertime sea ice in the Arctic is shrinking much faster than previously projected. The Arctic Ocean is expected to have its first ice-free summer within the next 30 years, not at the end of the 21st century as previously predicted.²

Climate change is raising sea levels

As ocean temperatures warmed over the past century, sea levels rose about eight inches.³ Now the accelerated melting of glaciers, ice caps and polar ice sheets also contributes to rising seas. Scientists predict that sea levels could rise an additional three to four feet within this century, with devastating consequences for low-lying, flood-prone areas.⁴

Climate change is altering the world's oceans

As levels of greenhouse gases increase, the oceans are absorbing greater amounts of carbon from the atmosphere. Not only does this reduce the oceans' capacity to absorb yet more carbon, it causes sea water to become more acidic. This increased acidity is causing widespread damage to the world's coral reefs, threatening the many marine species that rely on reef ecosystems.

Climate change is causing weather events to intensify

While some of Earth's regions are drought-stricken, others are receiving too much water. With increasing frequency, extreme rain events are exacerbating floods. Warmer ocean surface waters are fueling hurricanes of greater intensity and duration that will devastate coastal communities around the world.

² Science Daily, April 3, 2009.

³ IPCC, 2007. Summary for Policymakers.

⁴ IPCC press release.

Climate change is posing threats to human health and safety

Disease outbreaks and mass disruptions in food production and water distribution are predicted if man-made greenhouse gas emissions continue unchecked.

Fish and Wildlife at Risk on an Overheated Planet

Although in the past plants and animals have demonstrated remarkable resiliency, today's rate of change could outpace many species' ability to adapt.

Some species will respond to climate change by attempting to migrate to a more hospitable habitat. For example, some waterfowl could shift their ranges as global warming reconfigures vegetation and precipitation patterns. Coastal organisms could attempt to move inland as rising seas inundate shoreline habitats. Unfortunately, access to more hospitable environments could be restricted by predators; by natural barriers such as mountains, rivers and deserts; or by man-made barriers such as sea walls and roads. Development that blocks wildlife corridors or fragments wildlife habitats will reduce migratory success and could lead to the extinction of many vulnerable species.

Highly mobile species such as birds and big game might move to habitats where their presence disturbs the existing ecological community. Expanded ranges of pests and diseases could introduce new risks to migratory populations, while environmental factors such as declining water quality and availability, altered vegetative nutrition and increasingly frequent wildfires diminish a habitat's capacity to support wildlife.

Species that cannot migrate or are at the boundaries of their habitat could face extinction or extirpation. Particularly threatened are the many arctic species dependent on a world of ice. Current habitat changes imperil their very survival.

Climate change is also causing disruptions in the timing of critical life-cycle events. Plants are blooming and leafing out sooner in the year. Birds, insects and other wildlife are breeding, migrating or emerging from hibernation earlier. Shifts in the advent and length of growing seasons could alter critical pairings of predators and prey, of insects and their host plants. Foods may no longer be available when fish and wildlife need them.

The United Nations' Intergovernmental Panel on Climate Change (IPCC) has concluded that unless meaningful steps are taken to halt future warming, 20 to 30 percent of the world's plants and animals – perhaps a million species – could be pushed to the brink of extinction within the lifespan of a child born today.⁵

Planetary Systems Vulnerable to Climate Change

As well as threatening fish, wildlife and their natural habitats, climate change is damaging the planet's systems that provide clean air, clean water, food and places of shelter. The natural environment delivers fundamental life-support services such as water purification, soil production, nutrient cycling and drought and flood mitigation. As natural ecosystems are destroyed or diminished by climate change, humanity is forced to search for expensive but often inferior substitutes. However, in many instances there are no substitutes that people can create.

In 1997, the entire non-market value of Earth's ecosystems was estimated to be \$33 trillion, exceeding the world's gross domestic product.⁶ Humanity could not exist without these systems, yet often their value is acknowledged only when they are damaged or disrupted.

An examination of two ecosystems exemplifies the value of natural environments and their vulnerability to climate change.

⁵ IPCC, 2007.

⁶ Costanza, R., et al., "The Value of the World's Ecosystem Services and Natural Capital," *Nature* 387 (1997) 253-260.

Wetlands

Wetlands — marshes, estuaries, swamps, deltas and floodplains — are among nature's most productive ecosystems and perform multiple services.

Wetlands provide primary habitat for an enormous variety of fish, shellfish, amphibians, reptiles and birds.

Wetland aquatic nurseries are critical to sustaining sport and commercial fisheries.

Nearly 45 percent of the nation's threatened and endangered species and 85 percent of the country's waterfowl and other migratory birds rely on wetlands to rest, feed or breed.⁷

Wetlands across the country buffer intense rain events, purify water, provide sources of ground water, and filter and store surface water.

Wetlands produce soil and store carbon. Globally, wetlands may sequester as much as 700 gross tons of carbon.⁸

Coastal marshes and swamps control floods, buffer the force of hurricanes and diminish storm surges, thus delivering protective services valued at \$23 billion annually.⁹

Already subject to degradation from urban and rural development, America's low-lying, coastal wetlands face threats from increasingly violent storms, sea-level rise and saltwater intrusion — results of a warmer climate. Restoring the nation's wetlands, floodplain habitats and other natural buffer zones conserves critical ecosystems and protects human health and property.

Conservatively estimating the value of their ecosystem services at \$10,000 per acre, the 100 million acres of wetlands remaining in the lower 48 states deliver benefits worth approximately \$1 trillion.¹⁰

⁷ Stedman, S. and T.E. Dahl. 2008. *Status and Trends of Wetlands in the Coastal Watersheds of the Eastern United States 1998 - 2004*, National Oceanic and Atmospheric Administration, National Marine Fisheries Services and U.S. Department of Interior, Fish and Wildlife Service

⁸ Kusler, John. 2006. *Questions: Wetland, Climate Change, and Carbon Sequestration*. Association of State Wetland Managers.

⁹ Costanza, Robert et al., 2008. "The Value of Coastal Wetlands for Hurricane Protection." *Ambio*. 37: 4. 241.

Forests

As well as providing habitat for myriad species of fish and wildlife, forests deliver goods and benefits essential to the nation's health, commerce and well-being. Covering five hundred and twenty million acres, the forests of the United States stabilize soils and reduce erosion and flooding by slowing storm runoff and maintaining the integrity of riparian habitats purify air and store carbon by taking carbon dioxide out of the atmosphere purify water by absorbing rainfall, filtering water and refilling underground aquifers. Forestlands supply about 80 percent of the clean water needed for human consumption, agriculture and recreation. Watersheds located in national forests supply drinking water to 60 million Americans.¹¹ yield timber for fuel and shelter and present a potential source of energy that could replace fossil fuels provide recreational opportunities

In the western United States, where minimum winter temperatures have risen by as much as 10 degrees in 50 years, a warming climate threatens forestlands by fostering extensive droughts, catastrophic wildfires, invasive species and insect outbreaks. Without killing cold to limit larval survival, insects spread rapidly. For example, explosive pine beetle infestations increased by 50 percent between 2007 and 2008, affecting nearly 6.5 million forested acres in the U.S by preying on drought-stressed trees.¹²

¹⁰ The National Wildlife Foundation, Testimony of Larry Schweiger before the Subcommittee on Energy and Environment, House Committee on Energy and Commerce, March 25, 2009. See also, King, D., "The Dollar Value of Wetlands: Trap Set, Bait Taken, Don't Swallow," National Wetlands Newsletter 20 (1998): 9-11.

¹¹ Sedell, James, Maitland Sharpe, Daina Dravnieks Apple, Max Copenhagen and Mike Furniss. 2000. "Water and the Forest Service." U.S. Forest Service.

¹² "Some See Beetle Attacks on Western Forests as a Natural Event," New York Times, July 7, 2009.

Warmer conditions have led to regional die-offs of vast swaths of forests, creating ideal circumstances for catastrophic wildfires.¹³ Since the mid-1980s, major forest fires in the West have increased four-fold, and the area of acreage burned has increased six-fold. The wildfire season is now 78 days longer than in previous decades.¹⁴ Annual federal appropriations for fighting wildfires have risen to about \$3 billion.¹⁵ Fires release carbon stored in forests, raising greenhouse gas levels. Fires' extreme heat can damage the soils in forest watersheds, causing erosion and runoff that pollute water supplies. In the Southwest, water resources for millions of people are exposed to this risk.

*Altogether, the country derives more than \$60 billion in benefits from its forests each year.*¹⁶

The Economic Engine of Outdoor Recreation

Throughout the nation, rural communities rely on healthy ecosystems to support agriculture and logging, the traditional backbone of their economies. But often an outdoor recreation economy is also evident and responsible for job growth, rising income levels and improved social

¹³ Adams et al. 2009. Temperature sensitivity of drought-induced tree mortality portends increased regional die-off under global change-type drought. *Proceedings of the National Academies of Science*. 10.1073:1-4; Bentz, Barbara. 2008. Western U.S. Bark Beetles and Climate Change. (May 20, 2008). U.S. Department of Agriculture, Forest Service, Climate Change Resource Center; Peterson, David L. and McKenzie, Don. 2008. Wildland Fire and Climate Change. (May 20, 2008). U.S. Department of Agriculture, Forest Service, Climate Change Resource Center.

¹⁴ Westerling, A.L., H.G. Hidalgo, D.R. Cayan, T.W. Swetnam, "Warming and Earlier Spring Increase Western U.S. Forest Wildfire Activity," *Science* 18 August 2006; Vol. 313. no. 5789, pp. 940 - 943.

¹⁵ Wildland Fire Management: A Cohesive Strategy and Clear Cost-Containment Goals Are Needed for Federal Agencies to Manage Wildland Fire Activities Effectively. GAO-07-1017T June 19, 2007

¹⁶ Krieger, Douglas J. 2001. "Economic Value of Forest Ecosystem Services: A Review." The Wilderness Society.

conditions like health and education.¹⁷ Outdoor recreation resists the trend of sluggish economic growth in rural America even in economic downturns, as tough times encourage Americans to rediscover simple pleasures such as fishing, camping and observing wildlife.¹⁸

With more than three out of every four Americans engaging in some type of outdoor recreation, annual retail sales of outdoor equipment and expenditures on excursions approach \$300 billion. When the full economic effect is tallied, outdoor recreation contributes \$730 billion to the U.S. economy¹⁹ stimulates 8 percent of all consumer spending²⁰ provides 6.5 million jobs nationwide – one job out of every 20 contributes to all major sectors of the U.S. economy

Wildlife and Wilderness, Essential American Values

Beyond sustaining physical and economic health, nature nourishes the human mind and spirit. To experience the natural world fulfills a deeply seated human need.²¹ Even though 80 percent of Americans today live in metropolitan areas and may never encounter a grizzly bear or wolf,²² Americans deeply value the existence of wildlife and appreciate that wildness thrives.

¹⁷ Reader, Richard J. and Brown, Dennis M., "Recreation, Tourism, and Rural Well-being." U.S. Department of Agriculture, Economic Research Service, August 2005.

¹⁸ "As Recession Deepens, More Americans Go Fishing," Reuters, March 18, 2009. "State Parks: Minnesotans Are Out and About Even More," Star Tribune, April 20, 2009.

¹⁹ *The Active Outdoor Recreation Economy: a \$730 Billion Contribution to the U.S. Economy*, Outdoor Foundation, 2006.

²⁰ Ibid.

²¹ Kellert, S., and E.O.Wilson, *The Biophilia Hypothesis*, Island Press, 1993.

²² Inkley, D.B., A.C. Staudt, M.D. Duda, "Imaging the Future: Humans, Wildlife and Global Climate Change," *Wildlife and Society: The Science of Human Dimensions*, Island Press, 2008.

Cultivated over generations, American traditions are steeped in the country's wild places. The American people cherish the recreational opportunities found in nature. Each year
40 million Americans go fishing
13 million Americans hunt
guests visit national parks 270 million times
countless numbers hike and camp and view wildlife

Sporting experiences in fields and streams confirm that change is underway. Hunters, anglers and other outdoor enthusiasts are keenly aware that the country's treasured fish and wildlife are under pressure and that climate change threatens American traditions rooted in wild places and wildlife.

Funding Conservation to Respond to Climate Change

Unlike any previous conservation crisis, global climate change affects all ecosystems everywhere. To properly conserve wildlife and their habitats, particularly those that are most vulnerable or those providing the greatest environmental or economic value, requires on-the-ground actions the scale and cost of which challenge natural resource management worldwide. In the United States, federal and state fish and wildlife agencies are responsible for protecting and conserving the nation's wild places. Reducing the loss of wildlife and wildlife habitat resulting from climate change will require these agencies to adopt new strategies that
assist wildlife through actions such as acquiring land for migratory corridors, restoring habitats and assessing the vulnerability and monitoring the condition of wildlife populations
develop landscape-level conservation approaches, particularly those that are habitat-based
partner with parties across jurisdictional boundaries to encourage consistent management practices and achieve landscape-level conservation objectives
engage in efforts such as biological carbon sequestration projects and carbon emission reduction programs to mitigate the consequences of climate change

Costs for projects will vary depending on their time scales, geographic ranges and the degree of management required for implementation. The price tag for all federal and state natural resource initiatives confronting climate change will reach billions of dollars annually, but without this funding the environmental and economic losses could be catastrophic for the nation.

A New Era for Conservation

Taking swift action can significantly limit future damage and loss from a changing climate. Doing so will preserve a legacy of wildlife and wilderness to pass along to our children and grandchildren.

Some think that global climate change is too big and too intractable an issue to address and see no option but walking away from the problem, turning their backs on conservation. It is true that, even if funds and labor were unlimited, some species will be lost and unimagined new habitats will present new conservation issues. But whether considering the spiritual and psychological benefits of nature, the value of outdoor recreation or the importance of ecosystem services, failure to assist fish and wildlife adapting to climate change is not an option.

We owe it to our forefathers who protected wild places before us, to our grandchildren who will cherish the wild places we preserve, and to ourselves to face the challenges that lie ahead in a new era of conservation. While taking account of the enormous value of the natural environment to human health and prosperity, there is no dollar amount that can be assigned to the ethical duty to act and uphold our responsibility to pass a healthy planet on to the world's future generations.