

Chapter 11: NATURAL RESOURCES MANAGEMENT

BACKGROUND

- The security and wealth of nations depend on the health of their natural resources and ecosystems.
- [Healthy ecosystems provide a broad array of services](#) of enormous importance and economic value, including: a) providing food, fiber, raw materials, medicines, genetic materials and countless other products; b) regulating the conditions essential to human health, including global temperature, water supplies and the prevention of diseases through temperature and natural predators; c) providing cultural services, including recreation, education, religious and spiritual functions, inspiration and solace; and d) producing oxygen, forming soils, cycling nutrients, filtering and storing water, pollinating plants, controlling floods, sustaining wildlife vital to recreation, sequestering carbon and otherwise supporting human life and well-being.
- By one estimate, the U.S. economic value of ecosystem services averages \$33 trillion each year – nearly twice the global Gross Domestic Product.¹ Natural systems are under enormous stress from the demands on air, land, water and habitat for rapidly growing material consumption and human populations. ([World population is expected to exceed 9 billion people by mid-century.](#))
- [The Intergovernmental Panel on Climate Change reports](#) that the “resilience of many ecosystems is likely to be exceeded this century by an unprecedented combination of climate-change-associated disturbances (including) flooding, drought, wildfire, insects, ocean acidification and other global change drivers (e.g., land use changes, pollution, overexploitation of resources).”²
- [Hundreds of thousands of species are threatened by global warming](#), from massive predators to tiny insects. As species are lost, so too is their genetic information and the services they perform in the global ecosystem: food, medicine, natural beauty and ecological resilience.³
- Mitigating greenhouse gas emissions must go hand in hand with adapting to the changing climate. Natural resource management can play a significant role in mitigation – particularly through carbon sequestration.
- “...a portfolio of adaptation and mitigation measures can diminish the risks associated with climate change.”⁴ “...although even the most stringent mitigation efforts cannot avoid further impacts of climate change in the next few decades, which makes adaptation essential, particularly in addressing near-term impacts.”⁵
- Climate change is already occurring and even with aggressive intervention, an increase in global mean temperatures by at least 2 degrees Celsius appears inevitable. This is at or above the threshold for substantial and probably irreversible environmental damage. A substantial, well-funded and coordinated national response and adaptation strategy is needed to minimize the damage to natural resources and the benefits they provide.
- Science offers increasingly clear projections of likely ecological impacts from climate change, but we lack parallel scientific information to help inform actions for resource management and intervention during rapid ecological change.
- Nearly all federal natural resource management strategies were designed and drafted before global warming was widely acknowledged or its implications known. These historic assumptions and the patchwork of agencies, management missions and jurisdictions are significant impediments to effective action.

FRAMEWORK FOR FEDERAL POLICY

Adaptive natural resource management will require new approaches, given the expected pace and scale of environmental change. A national strategy is needed to protect environmental quality, natural resources, biodiversity and ecosystem health that integrates federal programs across agencies, using a variety of tools such as incentives, regulations, and stronger partnerships at the regional and state level and with tribes and the private sector. Any plan must be scientifically based and guided by a vision to protect and sustain ecological and human well-being in the face of a changing climate. Steps should include:

- Development of mechanisms to coordinate natural resources planning and ecosystem-based management across agencies and jurisdictions.
- Development of systems and capacity to rapidly gather information to quantify, monitor and prioritize critical natural resources and stresses, and develop responsive management strategies that will sustain ecosystem services and biodiversity as well as contribute to climate stability.
- Strengthening of federal resource management policies to minimize ecological impacts and assist species adaptation due to climatic changes.
- Reduction of other human-caused stresses on the natural environment such as habitat destruction and alteration, pollution, overconsumption and introduced invasive species.
- Building multi-disciplinary environmental sciences capacity and ecological literacy within government and society through investments in research, professional continuing education and retraining, preparation of future natural resource professionals focused on climate mitigation and adaptation, as well as public education and communication.
- Identifying and acting on opportunities to mitigate and adapt to climate changes through sound natural resource management.

EXECUTIVE ACTIONS

1. Direct federal resource management and environmental quality agencies Department of the Interior (DOI), United States Department of Agriculture (USDA), the Environmental Protection Agency (EPA), the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautic and Space Administration (NASA), to establish an interagency working group coordinated by the Council on Environmental Quality (CEQ) to develop a national strategy (and an implementation timetable) for biodiversity, wildlife, and ecosystem protection, anticipating changes in temperature, precipitation and hydrology, species distribution, phenology, and other effects related to climate change. Collaborate with other federal agencies engaged in climate and land-use, including the Department of Defense (DOD), Department of Energy (DOE), Department of Transportation (DOT) and the U.S. Army Corps of Engineers.
2. Support and define the functions and responsibilities of the National Climate Change and Wildlife Science Center (NCCWSC) within the United States Geological Survey (USGS) established by P.L. 110-161.

ASSOCIATED LEGISLATIVE ACTION: Urge Congress to enact the [Global Warming Wildlife Survival Act](#), which calls for: a) developing science-based national and state adaptation strategies for conserving fish, wildlife and habitat most threatened by global warming; b) establishing a national scientific advisory council to determine likely impacts of global warming on wildlife, and evaluate additional research and monitoring needs and management options; and the dedication of significant levels of federal funding for federal, state, and tribal natural resources agencies to protect wildlife and restore ecosystems, helping them to survive global warming's unavoidable impacts.

3. Direct the CEQ to expedite the interagency effort to develop national indicators of ecosystem health, to implement the indicators and to report on national progress every two years.
4. Direct the DOI, USDA, EPA and NOAA and other federal agencies as noted under item 1 to collaborate to inventory ecosystem services, and identify and map vulnerable species and ecosystems at risk due to climate change or other significant environmental threats. Include recommendations for responsive actions to protect threatened ecosystems and ensure continued ecosystem function.
5. Direct the NCCWSC to assess existing and potential ecological transition corridors. Identify and assess ownership patterns of areas that may serve as corridors to enable species to move in response to climate change and to inform and guide land-use planning and decisions at the landscape-level. Take advantage of tools such as the [USGS Gap Analysis](#) project to identify connections between protected areas. Partner with state wildlife management agencies, tribes and private organizations as appropriate to develop conservation recommendations and actions that will protect biodiversity.
6. Direct the NCCWSC to work with the U.S. Fish and Wildlife Service (USFWS), the National Park Service (NPS) and the Bureau of Land Management (BLM) to assess the emerging and projected impacts of climate change on the [National Wildlife Refuge System](#), National Parks, National Monuments and the other protected public lands managed by the DOI, and develop recommendations for responsive action to protect fish, wildlife, natural habitat and ecosystem services.
7. Direct the USDA to assess the emerging and projected impacts of climate change on the National Forests, including wilderness areas in National Forests and other protected public lands managed by the USDA, and develop recommendations for responsive action to protect fish, wildlife, natural habitat and ecosystem services.
8. Provide sufficient support for the interagency [U.S. Global Change Research Program](#) (USGCRP) to enhance support for mitigation and adaptation research, including response strategies. There is a particular need for enhanced research, assessment and communication activities at regional to local scales.
9. Direct the NCCWSC, NOAA and other natural resource research agencies to identify needs for climate research and monitoring that will provide data collection, integration and synthesis to support adaptive land, water and resource management plans and practices.
10. Provide funding for the USDA to quantify and understand the impacts of climate change on agriculture and the impacts of various agricultural practices on climate change.
11. Establish a new federal [Earth Systems Sciences agency](#), combining the research and information capacity of NOAA and the USGS.

ASSOCIATED LEGISLATIVE ACTION: Request Congress increase resources by at least doubling funding for all environmental research in four years.

- 12.** Direct the CEQ to establish a task force to identify policy gaps in the Clean Air Act, Clean Water Act, National Environmental Policy Act and other federal environmental laws related to addressing natural resource management in the context of global climate change. The analysis should also recommend provisions to address these gaps. Request an independent review of the analysis by the Environmental Law Institute and/or other independent organizations with expertise in U.S. environmental law.
- 13.** Direct the CEQ to require that all Environmental Impact Statements (EISs) address climate change impacts, including those on ecosystems, biodiversity and ecosystem services and to provide guidance on how to address these changes in an EIS. Further, direct EPA to use its authority under federal law to review EISs and prevent projects that will create adverse impacts on species and ecosystems stressed by climate change.
- 14.** Direct the CEQ to assess the adequacy of its procedures to review and quantify the impact of existing and proposed federal programs and policies on biodiversity, ecosystem functions and services. If current methods are not adequate, CEQ should lead an interagency effort to improve them.
- 15.** Direct federal agencies, as they design and propose new programs, policies and regulations, to assess their impact on biodiversity, ecosystem functions and services.
- 16.** Direct the CEQ to organize a Presidential Commission on Biodiversity to recommend how federal policy related to species, land use, natural resources, marine resources, trade policy, etc. can be strengthened to better address habitat loss, threatened ecosystems, over-consumption, invasive species, environmental degradation and other drivers of biodiversity loss, to minimize extinctions and loss of genetic diversity, species, populations and habitats in the face of threats from climate change.
- 17.** Direct DOI and USDA to review existing federal programs that support preservation and restoration of key habitats on private lands and recommend mechanisms to strengthen economic incentives and financial instruments to expand protected acreage.
- 18.** Allocate a minimum of \$9 billion annually in dedicated funding to protect natural resources, systems and services from the effects of climate change. To fund this amount, collect full royalties from energy development on public lands and in public waters; allocate a portion of revenues from greenhouse gas permits; and redirect revenues from federal subsidies for fossil and nuclear energy.
- 19.** Direct the U.S. Fish and Wildlife Service (USFWS) to reinvigorate efforts to identify endangered and threatened species under U.S. jurisdiction, including those on the [World Conservation Union Red List](#), and develop ark projects and other recovery strategies through partnerships between agencies, research institutions and private partners (such as the international effort focused on amphibian conservation).
- 20.** Develop a national water resources conservation strategy. (See Fresh Water chapter.)

ASSOCIATED LEGISLATIVE ACTIONS:

- a) Work with Congress and federal agencies to establish an ecosystem reserve program, based on existing protected areas, coordinating management across federal lands and establishing partnerships with state and private land managers to better protect core habitats, biodiversity, natural hydrology, environmental quality and other elements critical to ecosystem functions.
- b) Work with Congress to extend tax credits for permanent easements to keep forested land forested to create incentives for landowners who protect and manage habitat for native species.

21. Direct the USFWS, the EPA, the U.S. Forest Service (USFS) and the [NOAA National Marine Fisheries Services](#) (NMFS) working through the National Invasive Species Council to develop a national strategy to identify and control invasive species and nuisance species spreading due to a warming climate, with an initial emphasis on species destroying forests, and aquatic invasive species destroying freshwater food webs. Identify research needs and program needs; develop recommendations for responsive action where possible.
22. Direct EPA to reinvigorate enforcement of the Clean Water Act, Clean Air Act and other federal laws that protect environmental quality, and to identify budget needs to close gaps in staffing or other areas to strengthen compliance with regulatory programs.
23. Expand research and monitoring to evaluate the influence of increased temperature and changes in salinity, pH and water volume on lethal dose levels of permitted pollutants.
24. Direct agencies to implement the [precautionary principle](#) in natural resource and environmental management.⁶
25. Manage pollution through prevention as a primary strategy, while not neglecting regulatory and other controls.
26. Direct the BLM and the Minerals Management Service (MMS) to develop the analytical capacity to assess the impacts of energy production on public and private lands, potential wilderness, and marine environments and to use this capacity to complete assessments on these and other environmental factors before granting leases.
27. Direct the Office of Management and Budget (OMB) to identify key programs that protect watersheds, water quality, wetlands, native grasslands and soil and forest health; increase program budgets in the 2010 budget to expand institutional capacity for public stewardship
28. Integrate federal leverage in land use decisions for agriculture, transportation, community planning (e.g. through block grants) and other sectors to protect habitats, watersheds and ecosystem services. (See related recommendations under Fresh Water and Oceans chapters.)

ASSOCIATED LEGISLATIVE ACTIONS: Urge the Senate to ratify the United Nations [Convention on Biological Diversity](#) and to enact the [National Aquatic Invasive Species Act](#).

- 29.** Recruit experts for federal appointments in natural resource science and management and commit to protecting integrity in government science. Forbid political employees from interfering with the work or conclusions of federal scientists.
- 30.** Direct all federal resource agencies to develop and conduct climate literacy training for personnel to familiarize them with challenges, needs and responsive objectives appropriate to each agency.
- 31.** Direct all federal resource agencies to identify specific needs for professional training and capacity related to resource management and climate mitigation and adaptation within federal, state, private and tribal land management authorities in coordination with the National Climate Change and Wildlife Science Center.
- 32.** Assess (building on existing U.S. Forest Service research and other resources) the potential role of federal lands and resource management in mitigating and adapting to climate change. Include action plans to: a) protect old growth forests, wetlands, natural grasslands, soils and other habitats for the role they play in the natural sequestration of carbon; b) identify ecologically appropriate restoration strategies in forests, wetlands, grasslands and urban/suburban landscapes; c) identify native species that are disease-tolerant, able to thrive in current and anticipated climate conditions and effective at carbon sequestration; d) promote the use of these species in public and private reforestation in coordination with wildlife and watershed protection goals; and, e) institute carbon mitigation/sequestration banking and create a national protocol, including standards and policy, for Transferable Development Rights.

¹ R. Costanza et al., "The Value of the World's Ecosystem Services and Natural Capital," *Nature* 387 (May 15, 1997): 253–260, www.nature.com/nature/journal/v387/n6630/abs/387253a0.html

² M. L. Parry et al., "Summary for Policymakers," in *Climate Change 2007: Impacts, Adaptation and Vulnerability, Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge: Cambridge University Press, 2007). www.ipcc.ch/ipccreports/ar4-wg2.htm

³ "Saving Species Threatened by Global Warming," fact sheet, Earthjustice. www.earthjustice.org/library/policy_factsheets/species-global-warming.pdf

⁴ IPCC Working Group 2, p. 20. <http://www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-spm.pdf>

⁵ Ibid

⁶ In 2008, Canada adopted the Federal Sustainable Development Act, which requires the government to establish a Federal Sustainable Development Strategy with measurable targets for protecting Canada's environment in accordance with the precautionary principle. The new law was based on recommendations from a report: A National Sustainable Development Strategy for Canada, available at <http://www.davidsuzuki.org/Publications/NSDS.asp>