STATEMENT OF
DR. MARK D. MYERS, DIRECTOR
U.S. GEOLOGICAL SURVEY
U.S. DEPARTMENT OF THE INTERIOR
BEFORE THE
COMMITTEE ON NATURAL RESOURCES
SUBCOMMITTEE ON ENERGY AND MINERAL RESOURCES
U.S. HOUSE OF REPRESENTATIVES
OVERSIGHT HEARING ON
"TOWARDS A CLEAN ENERGY FUTURE:
ENERGY POLICY AND CLIMATE CHANGE ON PUBLIC LANDS"
MARCH 20, 2007

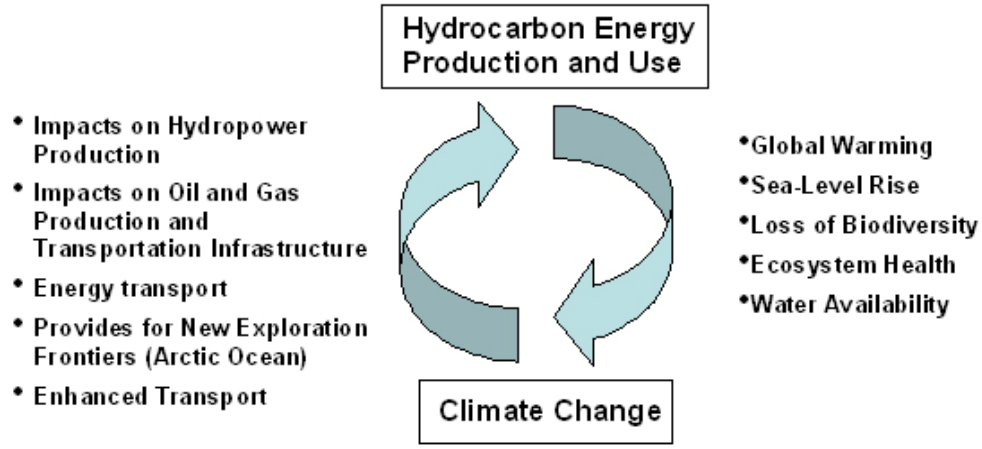
Mr. Chairman and Members of the Subcommittee, thank you for the opportunity to present testimony on the role of U.S. Geological Survey (USGS) science in addressing climate change impacts on public lands and potential energy resources.

The USGS has a long-standing history of conducting research, monitoring and modeling of climate change and its physical and biological impacts. This work includes strong multi-disciplinary capabilities and expertise that are well established and distributed across the United States, along with a proven capacity to assess prehistoric, historic, and current climate effects. These strengths provide USGS with a critical role in conducting climate change science across the Nation's terrestrial, freshwater, and coastal systems and in providing unbiased science to decision makers. The USGS works closely with our partners in the U.S. Climate Change Science Program to address the challenges posed by global climate change.

Global climate change is one of the most complex and formidable challenges facing society today. While climate change is a natural, continuous Earth process, changes to the Earth's natural climate are related to human activities as well. Whether the causes are natural or from human influence, our focus is on the impacts of climate change and the potential ecological and economic responses, including those impacts to energy infrastructure, production, and transportation.

Climate change affects biota, water, ecosystems, cultures, and economies. The Department of the Interior (DOI) therefore has a responsibility to further the scientific understanding of climate change processes and impacts in order to effectively manage its lands and trust resources. In addition, there is a critical connection between climate change and energy issues, including energy use, production, and transportation.

The Energy-Climate Feedback Loop



The figure above illustrates the climate-energy feedback loop where two components impact each other and perpetuate continued impacts (both positive and negative). Continued increases in fossil fuel energy use will lead to an increase in greenhouse gas emissions. This, in turn, may potentially lead to increased global temperatures and increases in climate change impacts such as permafrost degradation, sea-level rise, and an increased incidence of strong storms. These climate change impacts lead to a completion of the feedback loop with energy, including a decrease of water available to generate hydropower and damage to gas and oil production infrastructure (coastal and arctic pipelines). Some feedback impacts may actually have a positive effect on energy. For example, a decline in Arctic sea-ice may lead to enhanced oil and gas exploration within the coastal zones of the Arctic Ocean.

The United States and other nations will be challenged to develop adaptation and mitigation strategies that will anticipate the effects of a changing climate and its impacts on humans and ecosystems.

As the science bureau within DOI, USGS has a long history of participation as a member of the climate change science community. DOI, represented by USGS, is one of 13 Federal agencies engaged in global change research in support of the U.S. Global Change Research Act of 1990 and is represented as a member of the U.S. Climate Change Science Program and the Arctic Monitoring and Assessment Programme (AMAP). The USGS strives to understand how the Earth works and to anticipate changes in earth systems. To accomplish this, USGS science aims to understand the interrelationships among earth surface processes, ecological systems, and human activities. This includes understanding current changes in the context of pre-historic and recent earth processes, distinguishing between natural and human-influenced changes, and recognizing ecological and physical responses to changes in climate. The USGS has multi-disciplinary capabilities (biologic, geologic, hydrologic, geographic, remote sensing, and socio-economic) with scientific expertise distributed across the United States and many parts of the world. This ability to provide ground-truthing across multiple scientific disciplines in a wide

variety of spatial and temporal scales enables USGS to play a key role within the climate science community.

The USGS provides on-the-ground science information from its numerous observation and monitoring networks and research activities that span the biological, geological, geographical, and hydrological sciences. These observations and related research efforts are important components for building climate models, especially those that deal with the impacts of climate change to terrestrial, freshwater, and marine ecosystems.

Our findings and data provide critical information to decision-makers regarding many important climate-related issues, such as:

- Future availability of water for people and ecosystems. Specific projects include hydroclimatology studies in the Pacific Northwest and arid southwest for assessing current and future changes in water availability and related impacts on dam and reservoir management. The Bureau of Reclamation, as well as several State water agencies, are principal stakeholders for this work.

- Proliferation of invasive species and impacts on biodiversity, habitat, and ecosystems. USGS is conducting several major studies throughout the United States looking at the evolution of forest and rangeland communities as a response to warming climate and changes in precipitation. The U.S. Forest Service, several land resource bureaus of the Department of the Interior, and numerous State resource agencies are important stakeholders.

- Current and future trends of climate warming in the Arctic and resultant permafrost degradation and impacts on energy and transportation. USGS is conducting several coordinated studies on the North Slope and Yukon Basin of Alaska. Emphasis is on permafrost and climate effects monitoring and related ecological and socio-economic changes. This work is a partnership with the U.S. Forest Service, the U.S. Fish & Wildlife Service, the Bureau of Land Management, the National Park Service, the University of Alaska, Alaska State agencies, and various Native communities.

- Consequences of abrupt changes in climate including sea-level rise and impacts on low-lying coastal communities. USGS projects include the Chesapeake Bay and Greater Everglades Priority Ecosystem Studies. The USGS is collaborating with many partners, including the U.S. Army Corps of Engineers, the U.S. Environmental Protection Agency, the National Oceanic and Atmospheric Administration, and the land management bureaus within DOI.

- Impacts of climate change on land use and landscape change. In partnership with NASA and NOAA, USGS is involved in a variety of activities that are critical to understanding the impacts of climate change on public lands. These include monitoring of coastal zone topography and bathymetry; the production and distribution of national topography data; and improving our knowledge or topographic surface change through lidar and radar imaging of the U.S. national land surface.

The scientific and policy implications of mitigation strategies associated with these issues are complex. For example, rising sea-level exacerbates the vulnerability of coastal resources to coastal change due to storms and erosion. Vulnerable areas include thousands of miles of coastal resources for which DOI has land management responsibility. Efforts to alleviate coastal erosion and storm vulnerability often include "beach nourishment," the placement of large quantities of beach-quality sand on the beach and nearshore to build protective barrier beaches and dunes. With rising sea-level, the demands for beach quality sand, commonly extracted from offshore deposits, is likely to increase. In most regions, the quantity of this sand is limited, and the ability of recoverable resources to meet increased needs is in doubt. Moreover, recovery of in place resources can impact habitat and modify the natural movement of sediment between the nearshore and the coast. Additionally, the increasing demand is occurring as on-land sources for sand and gravel for construction are becoming more costly.

DOI has a significant interest in the mitigation of and adaptation to climate change due to the vast lands, natural resources, and communities for which it has responsibility. Of particular interest to this Committee are those impacts to public lands and the point where those public lands intersect with energy infrastructure, production, and transportation. These impacts may include:

- Shifts in carbon cycle, accelerated greenhouse gas emissions, and resultant effects on native communities, transportation networks, and managed infrastructure in high-latitude landscapes;
- Possible increases in the magnitude, frequency, and northern migration of strong storms and tidal surges related to changing climate and the associated risk to offshore and onshore oil and gas infrastructure and managed resources;
- Changes to strategies and cost of remediation and reclamation of lands disturbed by energy and mineral production, because of the added complexity created by climate change.
- Changes in the extent and severity of forest fires and associated effects on land management, forest composition, and carbon storage.

The USGS and other Federal agencies are actively engaged in understanding the impacts of climate change on both humans and ecosystems. USGS studies show that some impacts of climate change may be more urgent than others. For example, recent USGS image analysis of coastal erosion along a permafrost coastline in Northern Alaska showed a dramatic rate of coastal erosion – in some areas almost a kilometer of coastal erosion over the last 50 years. These findings have significant implications for energy development, native coastal villages, endangered species, and other land and resource management responsibilities.

Although science has come far in understanding the impacts of climate change on humans and ecosystems, many significant challenges and unique opportunities to better understand the long-term climate future for our planet remain. These include:

- Developing a holistic, earth-systems science approach to help communities and natural resource managers prepare for and reduce climate change impacts;
- Better distinguishing natural climate change from that imposed upon the natural system through human activities. The science must also address human-induced global change so that cost effective mitigation strategies can be developed and implemented by decision makers;
- Developing a better understanding of how the earth and its physical and biological processes interplay, and therefore collectively respond to climate change over the short-term and well into the future;
- Forecasting climate-related impacts to physical and biological systems;
- Forecasting precipitation changes as a consequence of changing climate;
- Determining how global warming affects, or may affect, the frequency, intensity, and paths of strong storms, including hurricanes;
- Understanding outcomes of climate change on ecosystems.

Thank you, Mr. Chairman, for the opportunity to present this testimony. I will be pleased to answer questions you and other Members of the Subcommittee might have.