



NATIONAL CLIMATIC DATA CENTER

Climate Services and Monitoring Division

How can I access climate data to meet the needs of my sector or user group?

What is the current state of the climate and how does it compare with the past?

The *Climate Services and Monitoring Division* at NOAA's National Climatic Data Center provides access to climatological data and information originating from both remotely- and directly-sensed data platforms. Weather observations, charts, publications, radar and satellite data, and a host of other climate data products and services are available to users via the web and with the assistance of climate services specialists. The efforts of the Division are focused in four primary areas:

User Engagement and Services

Sectoral engagement, defined as sustained, interactive dialogue with user groups to understand their data and information needs, is fundamental to the Division's operations. By interacting and communicating with user sectors regarding their needs through contacts, surveys, workshops, and conferences, the Division ensures data quality, ease of accessibility, usefulness, and usability through ongoing product and service development. The Division's meteorologists respond to thousands of inquiries each year, providing professional and technical service in interpreting, analyzing, and satisfying user requests for climate data of all types.

Monitoring and Assessment

As the Nation's *Climate Scorekeeper*, the Division monitors and assesses national, regional, and global climate in near real-time and places the current climate and weather into historical perspective. The *State of the Climate* product suite provides short-term (generally under one year) climatological

**NOAA's National Climatic Data Center
User Engagement Fact Sheet
Sector: AGRICULTURE**

OVERVIEW
A wide range of crops and livestock are grown in different climates and regions. In all areas, climate and weather conditions affect every aspect of agriculture. Seasonal temperatures and precipitation amounts determine what kind of crops will grow well and when they should be planted. Extreme weather-related events such as heat waves, cold snaps, severe storms, flooding, and drought can affect crop yields and livestock health and performance. Some of the factors that increase environmental stress on crops, such as drought or warmer temperatures, make crops more vulnerable to disease and attack by insects and plant pathogens. Gradually increasing temperatures due to climate change can cause an expansion of weeds into higher elevations and higher latitudes. Having access to relevant and easily understandable weather and climate information is essential to effectively managing and optimizing agricultural production.

KEY STAKEHOLDERS
NCDC works with various groups, both as an information provider and as a research partner, to examine the effects of weather and climate on agriculture. This helps farmers and other decision makers within the agriculture sector make practical and profitable responses to climate changes and variations. There are many different governmental and non-governmental organizations, public and private groups and businesses, and individuals, who can benefit from using pertinent climate- and weather-related information. Some major groups include:

- Federal agencies, such as the U.S. Department of Agriculture (USDA)
- Agricultural extension offices
- Academia and other researchers
- Corporations, such as those that provide food, and agricultural and risk management products and services
- Water resource managers
- Seed companies
- Farmers
- Entomologists
- Agrometeorologists

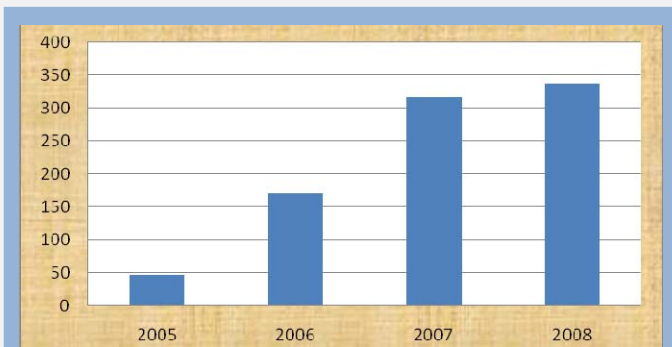
SECTOR NEEDS
Climate information is often available only as raw observations or in the form of tables, graphs, or written summaries, which may be difficult for users who are not well-versed in climate science to fully interpret. To bridge this gap, the agriculture sector is partnering with NCDC to translate climate data into accessible, useful, and accurate products; and to leverage NCDC's climate expertise to better understand what the information means and how to most effectively use it.

Climate information can be used in a variety of ways. Some examples include:

- Using monthly and annual precipitation data to understand the impact of El Niño on crop yields, correlating rainfall with production.
- Using meteorological data for entomology studies involving various pests and invasive species to determine optimal conditions for crop vulnerability.
- Using daily climate records to analyze and track crop yields based upon the number of "growing degree days"—a heat index that relates the development of plants, insects, and disease organisms to environmental air temperature, using a base temperature of 50°F.
- Using climate data to substantiate claims for crop losses due to inclement weather.

User engagement fact sheet for agriculture. NCDC has identified 11 user sectors which represent a majority of the users requesting climate data and information from the NCDC, including: *Agriculture, Civil Infrastructure, Coastal Hazards, Energy, Health, Insurance, Litigation, Marine and Coastal Ecosystems, Transportation, Tourism, and Water Resources.*

analyses tailored to specific monitoring requirements pertinent to the design, planning, development, and execution of climate-related activities. To this end, the Division works with other national and international organizations to develop consistent, integrated monitoring products and reports. It also contributes to regional, national, and international scientific assessments on the nature and consequences of a changing climate, in close coordination with NCDC's scientists.



NCDC data delivery in Terabytes by Fiscal Year (FY). In FY 2008, NCDC delivered over 338 Terabytes of online climate data, reflecting continued growth of satellite, in-situ, radar, and model data. Over 1.8 petabytes of data are now accessible from NCDC's web site.

Rapid and Ready Access

Through leveraging current and emerging web-based and other technologies, the Division *facilitates discovery, access, and use* of NOAA climate data to develop integrated data products in support of decision makers and other users. Data sources include in-situ, radar, model, and satellite data, and products derived from these data. The NOAA Virtual Data System (NVDS), the NOAA Operational Model Archive and Distribution System (NOMADS), and the National Integrated Drought Information System (NIDIS) are examples of systems and portals which are managed by the Division.

National and International Collaboration

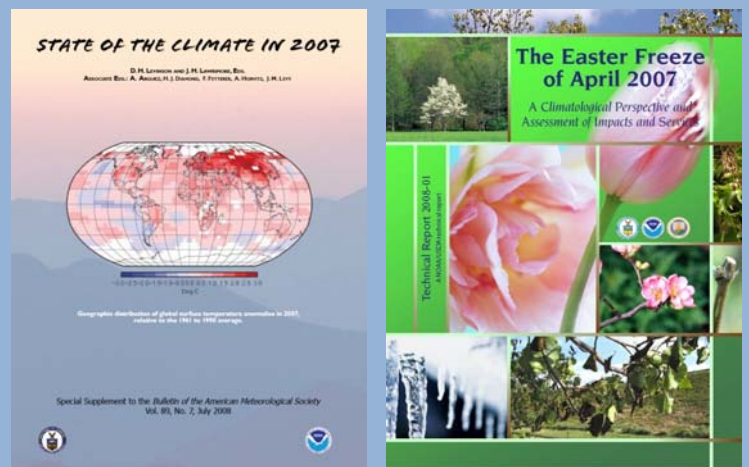
The Division provides leadership for NCDC and NOAA through *collaboration with key international and regional partners* active in the field of weather and climate observations, data products, and information services. These include: global observing systems and programs such as the Global Climate Observing System, the Global Observing System Information Center (GOSIC); Regional Climate Centers (RCCs), State Climatologists and their professional association; and the National Weather Service (NWS), Climate Program Office and other NOAA line organizations contributing to NOAA's climate services programs. The Division also supports the NOAA Integrated Data and Environmental Applications (IDEA) Center as a general test bed for the development and application of new climate products and information services, and supports climate information services in the Pacific region as part of the NOAA-organized Pacific Climate Information System.

A Major Player in an Emerging Climate Service

NCDC's Climate Services and Monitoring Division is a critical player in the emerging National Climate Service – through NCDC's 60-year legacy as a National Resource for Climate Information; through its leading role in the three-tiered national, regional, and state climate services infrastructure; and through its commitment to improving data access and offering innovative, authentic, and easily accessible environmental information to enhance economic and environmental decision-making for the Nation.



From contributions to NOAA-wide web endeavors to routine and special monitoring and assessment reports, NCDC's Climate Services and Monitoring Division is at the forefront in the provision of climate services.



NOAA's National Climatic Data Center User Engagement Fact Sheet

Sector: **AGRICULTURE**

OVERVIEW

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KEY STAKEHOLDERS

NOAA's National Climatic Data Center (NCDC) works with various groups, both as an information provider and as an applied research partner, to examine the effects of weather and climate on agriculture. This helps farmers and other decision makers within the agriculture sector make practical and profitable responses to climate changes and variations. There are many different governmental and non-governmental organizations, public and private groups and businesses, and individuals that can benefit from using pertinent climate and weather-related information. Some major groups include:

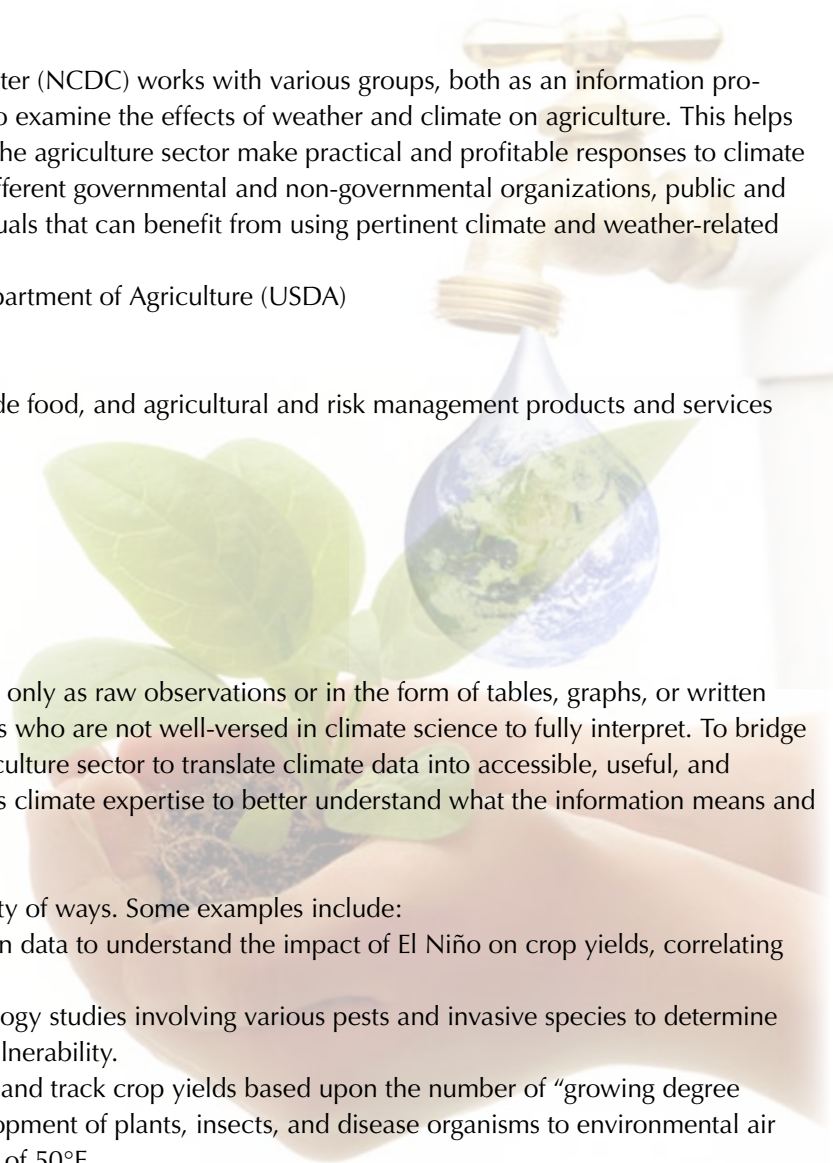
- Federal agencies, such as the U.S. Department of Agriculture (USDA)
- State agricultural extension offices
- Academia and other researchers
- Corporations, such as those that provide food, and agricultural and risk management products and services
- Water resource managers
- Seed companies
- Farmers
- Entomologists
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SECTOR NEEDS

Climate information is often available only as raw observations or in the form of tables, graphs, or written summaries, which may be difficult for users who are not well-versed in climate science to fully interpret. To bridge this gap, NCDC is partnering with the agriculture sector to translate climate data into accessible, useful, and accurate products; and to leverage NCDC's climate expertise to better understand what the information means and how it can be used most effectively.

Climate information can be used in a variety of ways. Some examples include:

- Using monthly and annual precipitation data to understand the impact of El Niño on crop yields, correlating rainfall with production.
- Using meteorological data for entomology studies involving various pests and invasive species to determine conditions most conducive for crop vulnerability.
- Using daily climate records to analyze and track crop yields based upon the number of "growing degree days"—an index that relates the development of plants, insects, and disease organisms to environmental air temperature, using a base temperature of 50°F.
- Using climate data to substantiate claims for crop losses due to inclement weather.



NCDC DATA and PRODUCTS

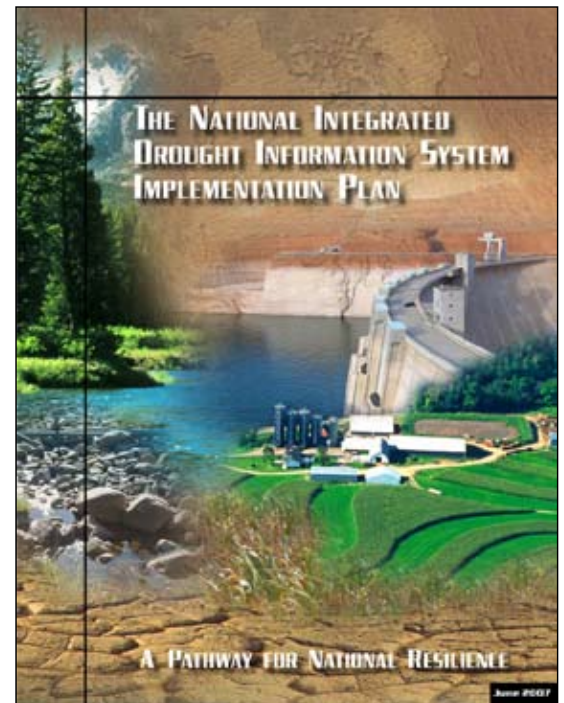
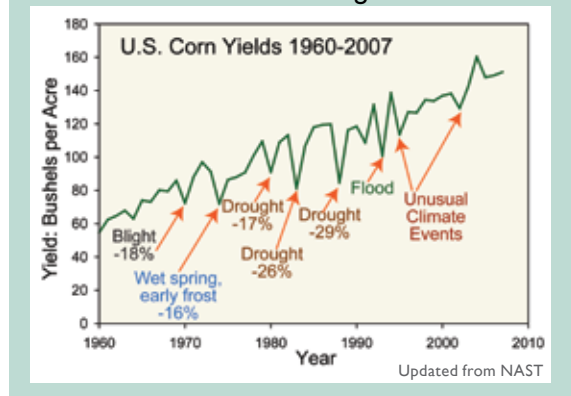
There are many different types of useful climate information available. Some examples include:

- A *Vegetation Index*, which is used to predict or assess vegetative characteristics such as plant leaf area, total biomass, and general health and vigor of the surface vegetation.
- A *Crop Moisture Stress Index*, which is a measure of the effects of drought and catastrophic wetness on national crop yields.
- The *U.S. and North American Drought Monitor*, which synthesizes multiple indices and impacts, representing a consensus of federal and academic scientists.
- The *National Integrated Drought Information System (NIDIS)*, which is a web portal-based multi-agency collaborative system that provides information about current drought conditions and impacts, and drought forecasts, planning, education, and research.
- CD-ROM/DVDs, such as the *International Station Meteorological Climate Summary*, which contains climatic data summaries from thousands of weather stations around the world, and *Integrated Surface Data* database, which contains climate information for about 10,000 weather stations, with some dating as far back as 1901.
- Publications, including *Local Climatological Data* (provides a monthly summary of daily observations), *Climatological Data* (provides annual average values), and *Comparative Climatic Data* (provides average and extreme values).

Collaboration between climate scientists and the agriculture community is essential in helping to build the necessary bridges that will transform climate data into information that is relevant and credible. Ongoing communication is important to ensure that the information NCDC provides is appropriate and applicable to agriculture sector needs. As climate changes in the years ahead and the effects become more noticeable, new information needs will emerge. NCDC will work closely with this sector, attending trade meetings and sponsoring future workshops and conferences, in order to better understand, address, and anticipate these needs.



Corn Yields Through 2007



Additional details about available NOAA products and the economic benefits of these products are provided at: <http://www.economics.noaa.gov>

For further information on obtaining NCDC climate services and products related to agriculture, please contact:

Customer Services Branch
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NOAA's National Climatic Data Center User Engagement Fact Sheet

Sector: CIVIL INFRASTRUCTURE

OVERVIEW

Infrastructure systems, such as buildings, schools, roads, bridges, water lines, sewage systems, communication systems, and power plants, are a fundamental part of daily life. Both rapid and gradual climate changes can affect these systems and have significant impacts on society. Extreme weather events, such as floods, droughts, hurricanes, and tornadoes, can heavily damage infrastructure, creating large clean-up and rebuilding costs. Heavy rains can overwhelm sewer and storm-water systems. Droughts can cause water shortages. Gradually changing temperatures can affect energy costs and air quality, as well as water quality and availability over time. A rising sea level will affect how and where new infrastructure is built in low-lying coastal areas and whether existing infrastructure needs to be relocated or redesigned. Facilities and systems can be designed, built, operated, and regulated to withstand, manage, or harness the impacts of weather and climate. Areas with high winds may be ideal for wind farm construction. Many different groups are involved in setting and regulating standards, designing and constructing various buildings and systems, operating and managing these facilities and systems, and providing insurance. Having access to pertinent long- and short-term weather and climate information is critical for these purposes.



KEY STAKEHOLDERS

NOAA's National Climatic Data Center (NCDC) works with various groups, both as an information provider and as an applied research partner, to examine the effects of weather and climate on civil infrastructure. This type of information can help engineers and decision makers within the civil infrastructure sector make practical decisions in order to adapt to climate

changes and variations and to mitigate possible effects. There are many different government and non-governmental organizations, and public and private groups and businesses that can benefit from using relevant climate and weather-related information. Some major groups include:

- Federal regulatory, environmental, and water resources agencies
- State natural resource and transportation departments
- State environmental agencies
- County and city governments
- Academia and other researchers
- Insurance companies
- Corporations that contribute in various ways to infrastructure facilities and systems
- Professional societies and trade groups



SECTOR NEEDS

Climate information is often available only as raw observations or in the form of tables, graphs, or written summaries, which may be difficult for users who are not well-versed in climate science to fully interpret. To bridge this gap, NCDC is partnering with groups within the industry to translate climate data into accessible, useful, and accurate products; and to leverage NCDC's climate expertise to better understand what the information means and how it can be used most effectively.

Climate information can be used in a variety of ways. Some examples are listed below:

- Using climate data to design and construct buildings to withstand hurricane-force winds.
- Using historic precipitation data to build roads above potential flood levels.
- Using maximum precipitation data for designing and constructing dams.
- Using hourly and daily temperatures to determine averages and frequency distributions, such as cooling and heating degree days, to design appropriate heating, cooling, and refrigeration systems.
- Using ice thickness (due to freezing rain) for structural design consideration.



NCDC DATA AND PRODUCTS

There are many different types of useful climate information available. Some examples include:

- Surface observations made at thousands of locations across the globe, for hourly, daily, and monthly averages.
- Summaries produced from data, such as temperature frequency distributions.
- *Dynamic Normals*, which provides daily and monthly averages and extremes for a given location.
- The *Air Freeze Index*, a measure of how much and how often air temperatures are above and below freezing during the winter, useful for determining if Frost-Protected Shallow Foundations (FPSF) should be utilized.
- CD-ROM/DVDs, such as the *International Station Meteorological Climate Summary (ISMCS)*, which contains climatic data summaries from thousands of weather stations around the world, and *Integrated Surface Data*, which contains climate information dating as far back as 1901 for about 10,000 weather stations.
- Publications, including *Local Climatological Data* (provides a monthly summary of daily observations), *Climatological Data* (provides annual average values), *Comparative Climatic Data* (provides average and extreme values), and *Storm Data* (provides monthly reports of damaging weather).



Collaboration between climate scientists and the civil infrastructure community is essential in helping to build the necessary bridges that will transform climate science into information that is relevant and credible. Having NOAA membership on selected committees has proven to be an excellent way to improve communication and information use. Ongoing communication is important to ensure that the information that NCDC provides is appropriate and relevant to civil infrastructure needs. As climate changes in the years ahead and the effects become more noticeable, new information needs will emerge. NCDC will work closely with this sector, attending trade meetings and sponsoring future workshops and conferences, in order to better understand, address, and anticipate these needs.



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NOAA's National Climatic Data Center User Engagement Fact Sheet Sector: **COASTAL HAZARDS**

OVERVIEW

Global climate change and extreme coastal weather events pose an enormous challenge to the coastal hazards sector. The destructive potential of Atlantic hurricanes has increased in recent decades. In the future, hurricanes and other tropical storms—and the strong winds, heavy rains, and high seas that accompany them—are likely to become more intense. Sea-level rise is expected to continue and possibly accelerate over the next century and beyond. A rising sea level, combined with extratropical and tropical storms, poses an increasing threat to coastal cities, residential communities, infrastructure, beaches, wetlands, and ecosystems. Some potential impacts include increased flooding, inundation, and shoreline erosion. Reducing risk to human life and to a community's economic, social, cultural, and environmental assets from climate and weather-related events is a major concern. Climate changes and variations and extreme weather events occur at a variety of time scales, from hours to years. Having access to useful and timely information products and services that aid decision makers in reducing vulnerability and increasing resiliency is critical to protecting people and maintaining healthy ecosystems and robust economies.

KEY STAKEHOLDERS

NOAA's National Climatic Data Center (NCDC) works with various groups, both as an information provider and as an applied research partner, to examine the effects of weather and climate on coastal hazards. This helps decision makers within the coastal hazards sector establish practical responses to climate change and extreme weather events. There are many different governmental and non-governmental organizations, public and private groups and businesses, and individuals that can benefit from using relevant climate and weather-related information. Some major groups include:

- Federal, state, and local emergency managers
- Federal, state, and local mitigation planners and coastal resource managers
- Government agencies and non-government entities that support critical infrastructure and essential facilities, including energy, transportation, and communication
- Recreation and tourism groups and businesses
- Agriculture and fisheries industries
- Academia and other researchers, including meteorologists, oceanographers, and engineers
- Public- and private-sector weather forecasters

SECTOR NEEDS

Climate information is often available only as raw observations or in the form of tables, graphs, or written summaries, which may be difficult for users who are not well-versed in climate science to fully interpret. To bridge this gap, NCDC is partnering with the coastal hazards sector to translate climate data into accessible, useful, and accurate products; and to leverage NCDC's climate expertise to better understand what the information means and how it can be used most effectively.



Climate information can be used in a variety of ways. Some examples include:

- Using climate data related to frequency, intensity, and duration of extreme weather events, such as hurricanes, to assess potential mitigation and adaptation strategies.
- Using rainfall data to help develop coastal erosion control procedures for local construction projects.
- Using local climatology data to assist in the design and construction of homes and infrastructure that can withstand hurricanes, storm surge, and other extreme coastal weather events.
- Using tide gauge data to evaluate local sea-level rise and the potential impacts on residential communities, infrastructure, and transportation in low-lying coastal regions.



NCDC DATA AND PRODUCTS

There are many different types of useful climate information available. Examples include:

- The *Global Historical Climate Network*, which contains historical temperature, precipitation, and pressure data for thousands of land stations around the world.
- The *Integrated Surface Data* database, which contains climate information for about 10,000 weather stations, with some information dating back as far as 1901.
- Global tropical cyclone positions and intensities in the *International Best Track Archive for Climate Stewardship (IBTrACS)* tropical cyclone database.
- The *Socioeconomic Website Initiative (SWI)*, which presents a centralized, organized, and searchable source of information about the economic and social value and application of NOAA's data products, as well as the economic costs of extreme events on the environment and society.
- *Pacific Region Integrated Climatology Information Products (PRICIP)*, which involves analyses of historical records collected throughout the Pacific region, and combines these climatological analyses with near-real-time observations to put the current weather into a longer-term perspective. Datasets and information from various coastal observing stations are provided for strong winds, heavy rains, and high seas.

Collaboration between climate scientists and the coastal hazards community is essential in helping to build the necessary bridges that will transform climate science into information that is relevant and credible. Ongoing communication is important to ensure that the information NCDC provides is appropriate and applicable to coastal hazards sector needs. As climate changes in the years ahead and the effects become more noticeable, new information needs will emerge. NCDC will work closely with this sector, attending trade meetings and sponsoring future workshops and conferences, in order to better understand, address, and anticipate these needs.

Additional details about available NOAA products and the economic benefits of these products are provided at:

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For further information on obtaining NCDC climate services and products related to coastal hazards, please contact:

Customer Services Branch

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NOAA's National Climatic Data Center User Engagement Fact Sheet Sector: CONSTRUCTION

OVERVIEW

The construction industry is comprised of a wide range of businesses involved in engineering standards, building design, and the construction of various types of materials and structures. This sector is affected in many ways by climate change and variability as well as extreme weather events. Long-term climate impacts, such as sea-level rise, coastal erosion, and drought; and short-term weather-related impacts, such as high winds and flooding, influence the choice of site construction, building techniques, and materials. The potential risk of inclement weather and climate conditions can influence planning project completion timelines. A changing climate can lead contractors to build smarter structures that are more energy efficient and cost-effective. Facilities can be designed, built, operated, and regulated to withstand, manage, or harness the impacts of weather and climate. Having access to relevant and easily understandable weather and climate data is essential for strategic planning purposes, risk management, and assessing environmental footprints.

KEY STAKEHOLDERS

NOAA's National Climatic Data Center (NCDC) works with various groups, both as an information provider and as an applied research partner, to examine the effects of weather and climate on construction. This type of information can help engineers, builders, and decision makers within the construction sector make practical decisions in order to adapt to climate changes and variations and to mitigate possible effects. There are many different government and non-governmental organizations, and public and private groups and businesses that can benefit from using relevant climate and weather-related information. Some major groups include:

- Corporations that contribute in various ways to construction
- Professional societies and trade groups
- State natural resource and transportation departments
- City and county governments
- State environmental agencies
- Academia and other researchers

SECTOR NEEDS

Climate information is often available only as raw observations or in the form of tables, graphs, or written summaries, which may be difficult for users who are not well-versed in climate science to fully interpret. To bridge this gap, NCDC is partnering with groups within the industry to translate climate data into accessible, useful, and accurate products; and to leverage NCDC's climate expertise to better understand what the information means and how it can be used most effectively.

Climate information can be used in a variety of ways. Some examples include:

- Using precipitation data to design and build natural gas pipeline trenches that will withstand saturated ground conditions.
- Using temperature data to determine the optimal thermal characteristics of buildings for insulation purposes, and to determine heating, cooling, and ventilation requirements.
- Using precipitation data to develop erosion control procedures for construction projects.
- Using rainfall data to help determine optimal locations for building new outdoor sports arenas.

- Using past hurricane information and related meteorological data to help in the construction of residential and commercial buildings, including floating docks in coastal regions.
- Using historical rainfall data to plan ahead for “rain days”—days in which no outdoor work can be conducted due to precipitation events—during construction projects.
- Using ice thickness and freezing rain data for engineering design consideration in the construction of certain structures that are subject to outdoor weather.



NCDC DATA AND PRODUCTS

There are many different types of useful climate information available. Examples include:

- Surface observations made at thousands of locations across the globe for hourly, daily, and monthly averages.
- Summaries produced from data, such as temperature frequency distributions.
- *Climate Normals*, which are the average values of meteorological elements, such as temperature, precipitation, frost/freeze data, and snowfall data, over 30 years. The normal climate helps describe the climate and is used as a base to which current conditions can be compared.
- The *Air Freeze Index*, which is a measure of how much and how often air temperatures are above and below freezing during the winter, useful for determining if Frost-Protected Shallow Foundations (FPSF) should be utilized.
- Global tropical cyclone positions and intensities in the *International Best Track Archive for Climate Stewardship (IBTrACS)* tropical cyclone database.
- CD-ROM/DVDs, such as the *International Station Meteorological Climate Summary*, which contains climatic data summaries from thousands of weather stations around the world, and *Integrated Surface Data*, which contains climate information dating as far back as 1901 for about 10,000 weather stations.
- Publications, including *Local Climatological Data* (provides monthly average values), *Climatological Data* (provides monthly and annual average values), *Comparative Climatic Data* (provides average and extreme values), and *Storm Data* (provides monthly reports of damaging weather).



Collaboration between climate scientists and the construction community is essential in helping to build the necessary bridges that will transform climate science into information that is relevant and credible. Having NOAA membership on selected committees has proven to be an excellent way to improve communication and information use. Ongoing communication is important to ensure that the information that NCDC provides is appropriate and applicable to construction sector needs. As climate changes in the years ahead and the effects become more noticeable, new information needs will emerge. NCDC will work closely with this sector, attending trade meetings and sponsoring future workshops and conferences, in order to better understand, address, and anticipate these needs.

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NOAA's National Climatic Data Center

User Engagement Fact Sheet

Sector: ENERGY

OVERVIEW

The energy sector is comprised of a wide range of businesses involved in the exploration, extraction, production, refining, distribution, and sale of energy. The primary industries within this sector include petroleum, gas, electric, coal, and nuclear energy, along with renewable energies such as solar, wind, hydropower, and biomass. Climate change and expected changes in the frequency of extreme weather events pose a major challenge to the energy industry. Warming temperatures directly affect heating and cooling requirements and also lead to rising sea level, altered precipitation patterns, reduced snowpack and earlier melt, and other climate change impacts that in turn can affect energy supply and demand, the distribution of fuel sources, and the future locations of power plants. This sector is unique in that not only are its business practices affected by climate change, but energy production and use also play a dominant role in warming of the atmosphere and oceans. Climate can affect environmental trends, with effects on business plans, regulatory requirements, and operations. Having access to relevant and easily understandable weather and climate data is essential for strategic planning purposes, risk management, and for assessing environmental footprints.

KEY STAKEHOLDERS

NOAA's National Climatic Data Center (NCDC) works with various groups, both as an information provider and as an applied research partner, to examine the effects of weather and climate on energy. This type of information can help engineers and decision makers within the energy sector make practical choices in order to adapt to climate changes and variations and to mitigate possible impacts. There are many different government and non-governmental organizations, and public and private groups and businesses that can benefit from using relevant climate and weather-related information.

Some major groups include:

- Energy corporations and utility companies
- Energy regulators
- Professional societies and trade associations
- The U.S. Department of Energy
- The U.S. Environmental Protection Agency
- The Electric Power Research Institute
- Academia and other researchers



SECTOR NEEDS

Climate information is often available only as raw observations or in the form of tables, graphs, or written summaries, which may be difficult for users who are not well-versed in climate science to fully interpret. To bridge this gap, NCDC is partnering with the energy sector to translate climate data into accessible, useful, and accurate products; and to leverage NCDC's climate expertise to better understand what the information means and how it can be used most effectively.

Climate information can be used in a variety of ways. Some examples include:

- Using global surface hourly data for studies of wind energy potential to drive wind turbines for electricity generation.
- Using solar radiation data to estimate solar energy potential.
- Using temperature information to aid in the assessment of equipment requirements for heavy power line loads during extremely hot weather.



- Using hourly temperature, relative humidity (and/or dew point), cloud cover, precipitation, and wind speed and direction data in electric load forecasting models and scenario analyses, for use by utility and power trading companies.
- Using heating/cooling degree day data—measures of expected energy usage for heating and cooling, based on cumulative daily average temperature observations below (heating degree days) or above (cooling degree days) a specific threshold, typically 65°F—to help energy regulators determine what rates electric utilities can charge their customers.



NCDC DATA AND PRODUCTS

There are many different types of useful climate information available. Some examples include:

- *Climate Normals*, which are the average values of meteorological elements, such as temperature, precipitation, frost/freeze data, and snowfall data, over 30 years. The normal climate helps describe the climate and is used as a base to which current conditions can be compared.
- The *Residential Energy Demand Temperature Index* (REDTI), which is based on population-weighted heating and cooling degree days.
- The *Severe Weather Data Inventory* (SWDI), which includes information critical to the detection and evaluation of severe weather derived from radar, such as features related to general storm structure, hail, and tornadoes, preliminary and verified reports of storm damage, and National Weather Service warnings.
- The *Integrated Surface Data* database, which contains climate information such as wind speed and direction for about 10,000 stations, with some dating as far back as 1901.
- The *National Solar Radiation Database*, which contains hourly solar radiation and meteorological data for more than 1400 stations.



Collaboration between climate scientists and the energy community is essential in helping to build the necessary bridges that will transform climate data into information that is relevant and credible. Having NOAA membership on selected committees has proven to be an excellent way to improve communication and information use. Ongoing communication is important to ensure that the information NCDC provides is appropriate and applicable to energy sector needs. As climate changes in the years ahead and the effects become more noticeable, new information needs will emerge. NCDC will work closely with this sector, attending trade meetings and sponsoring future workshops and conferences, in order to better understand, address, and anticipate these needs.



Additional details about available NOAA products and the economic benefits of these products are provided at:

<http://www.economics.noaa.gov>

For further information on obtaining climate services and products related to energy from NCDC please contact:

Customer Services Branch

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User Engagement Fact Sheet

Sector: **HEALTH**



OVERVIEW

Climate and weather events can impact human health in many ways. Climate trends, such as warming temperatures and changes in precipitation patterns, can affect the distribution of waterborne and vector-borne diseases. Weather patterns, such as heavy rains—expected to increase as climate changes—can lead to flooding, which can cause direct injuries as well as increased incidence of waterborne diseases. Poor air quality can lead to asthma and other respiratory ailments. Gradually increasing temperatures can increase the frequency and duration of stagnant air masses that allow pollution to accumulate, which will exacerbate health symptoms. Overexposure to UV radiation can increase the risk of skin cancer, and weather events such as heat waves, extreme cold, and drought often increase the rate of morbidity and mortality. Providing access to relevant climate information is essential to understanding how climate trends and weather patterns affect human health and for developing appropriate planning, adaptation, and mitigation strategies.

KEY STAKEHOLDERS

NOAA's National Climatic Data Center (NCDC) works with various groups, both as an information provider and as an applied research partner, to examine the effects of weather and climate on human health. This type of information can help decision makers and stakeholders within the health sector make practical decisions in order to adapt to climate changes and variations and to mitigate possible effects. There are many different governmental and non-governmental organizations, public and private groups and businesses, and individuals that can benefit from using relevant climate and weather-related information. Some major groups include:

- Federal government agencies, such as the Centers for Disease Control and Prevention, the National Institutes of Health, and the U.S. Environmental Protection Agency
- Physicians
- Pharmaceutical companies
- Biometeorologists
- Epidemiologists
- Hospital administrators
- Public health officials
- Academia and other researchers



SECTOR NEEDS

Climate information is often available only as raw observations or in the form of tables, graphs, or written summaries, which may be difficult for users who are not well-versed in climate science to fully interpret. To bridge this gap, NCDC is partnering with the health sector to translate climate data into accessible, useful, and accurate products; and to leverage NCDC's climate expertise to better understand what the information means and how it can be used most effectively.

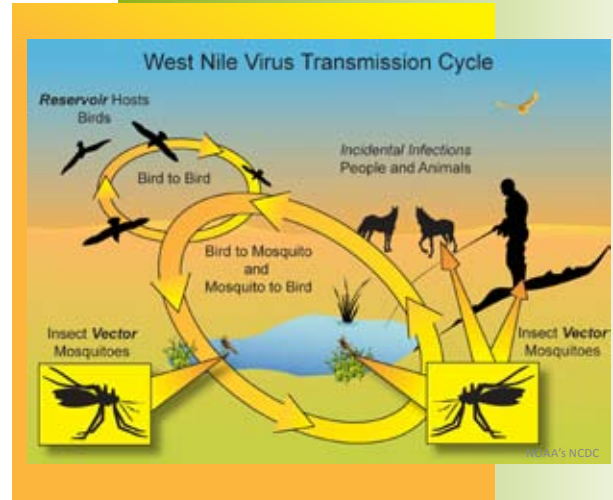
Climate information can be used in a variety of ways. Some examples include:

- Using precipitation data to investigate the relationship between increased flooding and waterborne disease outbreaks.
- Using relative humidity and wind speed data to study the relationship between fine particulate air pollution and daily mortality counts.
- Using temperature data to investigate correlations between temperature and total coliform bacterial contamination from public water drinking systems.

- Using atmospheric data to correlate sudden changes in atmospheric pressure with the rupturing of the amniotic sac during pregnancy. Studies have shown an increase in frequency of this membrane rupturing after strong cold frontal passages.

NCDC DATA AND PRODUCTS

- There are many different types of useful climate information available. Examples include:
- The *U.S. Heat Stress Index*, which is an assessment of “how hot it feels”, based on measured temperature and relative humidity.
 - The *National Integrated Drought Information System*, which is a web-based portal multi-agency collaborative system that provides information about current drought conditions and impacts, and drought forecasts, planning, education, and research.
 - The *West Nile Virus Mosquito Crossover Dates Indicator*, which provides estimates of the dates when the northern house mosquito—the primary suspect for transmission of the disease to humans—becomes the dominant species in a particular area. The peak infection rate in mosquitoes occurs about two to three weeks after the northern house mosquito becomes the dominant species, representing the period of greatest risk of transmission (in development, currently only available for Illinois).
 - CD-ROMs/DVDs, such as the *International Station Meteorological Climate Summary*, which contains climatic data summaries from thousands of weather stations around the world, and the *Integrated Surface Data* database, which contains climate information for about 10,000 weather stations, with some information dating back as far as 1901.
 - Publications, including *Storm Data* (provides monthly reports of damaging weather), *Local Climatological Data* (provides a monthly summary of daily observations), *Climatological Data* (provides annual average values), and *Comparative Climatic Data* (provides average and extreme values).



Collaboration between climate scientists and the health community is essential in helping to build the necessary bridges that will transform climate science into information that is relevant and credible. Ongoing communication is important to ensure that the information that NCDC provides is appropriate and applicable to health sector needs. As climate changes in the years ahead and the effects become more noticeable, new information needs will emerge. NCDC will work closely with this sector, attending trade meetings and sponsoring future workshops and conferences, in order to better understand, address, and anticipate these needs.

Additional details about available NOAA products and the economic benefits of these products are provided at: <http://www.economics.noaa.gov>

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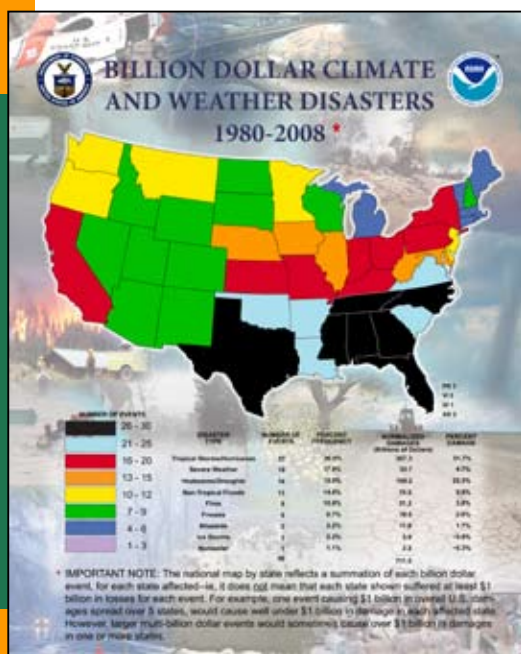
NOAA's National Climatic Data Center User Engagement Fact Sheet

Sector: **INSURANCE/REINSURANCE**

OVERVIEW

Global climate change and the expected increasing frequency of extreme weather events pose an enormous challenge to the insurance/reinsurance industry, the world's largest economic sector. Weather-related disasters can cause billions of dollars in damage. Since 1980, the United States has sustained more than 90 disasters in which damage reached or exceeded \$1 billion, with total losses exceeding \$700 billion.

Research indicates that the insurance industry experiences an event such as a hurricane, drought, or severe flooding that costs at least \$20 billion every 10 to 12 years on average. These extreme events can cause injury, death, destruction to property, agricultural losses, and interruption to industrial and commercial business operations. The continued increase in the value of insurance portfolios, particularly in vulnerable coastal areas, heightens the need for additional weather and climate data for improved decision making. Having access to relevant and easily understandable climate information is essential to effectively assess trends and plan for the future.



KEY STAKEHOLDERS

NOAA's National Climatic Data Center (NCDC) works with various groups, both as an information provider and as an applied research partner, to examine the effects of weather and climate on insurance. This helps decision makers within the insurance sector make practical assessments of extreme weather events and climate change. There are many different governmental and non-governmental organizations, public and private groups and businesses, and individuals that can benefit from using pertinent climate and weather-related information. Some major groups include:

- Insurance and reinsurance companies
- Federal and state insurance regulators
- Catastrophe risk modelers
- Commercial banks
- Lawyers and litigators
- Professional societies and trade groups
- Federal, state, and local emergency management officials

SECTOR NEEDS

Climate information is often available only as raw observations or in the form of tables, graphs, or written summaries, which may be difficult for users who are not well-versed in climate science to fully interpret. To bridge this gap, NCDC is partnering with the insurance sector to translate climate data into accessible, useful, and accurate products; and to leverage NCDC's climate expertise to better understand what the information means and how it can be used most effectively.



Climate information can be used in a variety of ways. Some examples include:

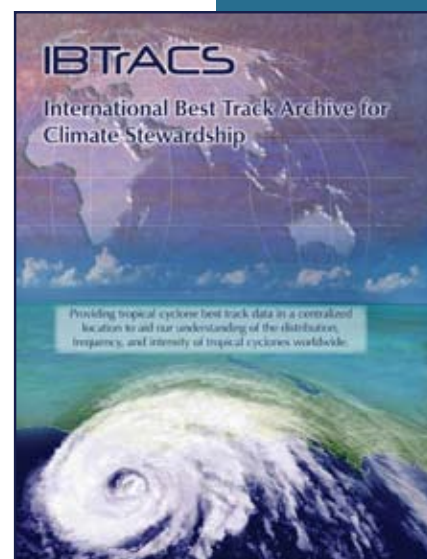
- Using hurricane, tornado, hail, snowfall, and other extreme event data to perform risk analyses.
- Using monthly climate summaries to validate industry catastrophe (CAT) models, which simulate the geographical risk associated with natural or manmade catastrophes.
- Using measurements such as surface roughness, overland decay, and wind speed and direction to improve hurricane risk models in order to better predict insurance losses.
- Using validated weather and climate data to justify insurance claims and payouts.

NCDC DATA and PRODUCTS

There are many different types of useful climate information available. Some examples include:

- Surface observations made at thousands of locations across the globe, for hourly, daily, and monthly averages.
- Global tropical cyclone positions and intensities in the *International Best Track Archive for Climate Stewardship* (IBTrACS) tropical cyclone database.
- The *Severe Weather Data Inventory* (SWDI), which includes information critical to the detection and evaluation of severe weather derived from radar, such as features related to general storm structure, hail, and tornadoes, preliminary and verified reports of storm damage, and National Weather Service Warning areas.
- The *U.S. and North American Drought Monitor*, which are synthesis products of multiple indices and impacts that represent a consensus of federal and academic scientists.
- Publications, including *Local Climatological Data* (provides a monthly summary of daily observations), *Comparative Climatic Data* (provides average and extreme values), and *Storm Data* (provides monthly reports of damaging weather).

Collaboration between climate scientists and the insurance community is essential in helping to build the necessary bridges that will transform climate data into information that is relevant and credible. Ongoing communication is important to ensure that the information NCDC provides is appropriate and applicable to insurance sector needs. As climate changes in the years ahead and the effects become more noticeable, new information needs will emerge. NCDC will work closely with this sector, attending trade meetings and sponsoring future workshops and conferences, in order to better understand, address, and anticipate these needs.



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User Engagement Fact Sheet

Sector: **LITIGATION**



OVERVIEW

Weather and climate affect most aspects of life. Information about particular weather or climate conditions can influence legal issues such as traffic accidents, construction delays, property damage, agricultural losses, work-related accidents, personal injury, and unlawful death or homicide. In many areas of litigation, weather factors can be critical, and sometimes determining, factors in establishing liability. NOAA's National Climatic Data Center (NCDC) is the official archive facility for U.S. climatic data records and can provide exact duplicates of climatic records on file. Properly authenticated copies or transcripts of records or publications can be admitted in evidence as equal to the original documents. Having access to relevant and accurate weather and climate information is essential to effectively assist in proving or disproving whether environmental conditions may have influenced any circumstances surrounding a judicial case.



KEY STAKEHOLDERS

There are many different governmental and non-governmental organizations, public and private groups and businesses, and individuals that can benefit from using relevant climate and weather-related information for their legal needs and services. Some examples of key stakeholders in the litigation sector who are relevant to the resolution of legal disputes include those involved in:

- Motor vehicle, aviation, railroad, marine, and boating accidents
- Extreme weather incidents and accidents
- Environmental issues, such as air pollution and poor air quality
- Engineering, structural design, and construction
- Criminal investigations and forensic meteorology
- Insurance disputes
- Agricultural interests



SECTOR NEEDS

Climate information is often available only as raw observations or in the form of tables, graphs, or written summaries, which may be difficult for users who are not well-versed in climate science to fully interpret. To bridge this gap, NCDC is partnering with groups within the litigation sector to translate climate data into accessible, useful, and accurate products; and to leverage NCDC's climate expertise to better understand what the information means and how it can be used most effectively.



Climate information can be used in a variety of ways. Some examples include:

- Using meteorological data as evidence in court to help prove or disprove theories in criminal or civil investigations.
- Using hourly surface weather observations and area weather summaries as evidence for injuries or death argued to be caused by weather conditions.
- Using hourly surface weather observations to help prove or disprove if weather conditions, such as rain, snow, ice, wind, or sunshine, contributed to various types of accidents.
- Using surface and upper air observations and charts, Doppler radar, and satellite images to investigate the causes of aviation incidents and accidents.
- Using meteorological data to reconstruct localized weather events.



NCDC DATA AND PRODUCTS

There are many different types of useful climate information available. Examples include:

- The *Severe Weather Data Inventory* (SWDI), which includes information critical to the detection and evaluation of severe weather derived from radar, such as features related to general storm structure, hail, and tornadoes, preliminary and verified reports of storm damage, and National Weather Service Warning areas.
- Hourly and daily reports in the form of Surface Weather Observations derived from the *Quality-Controlled Local Climatological Data* and daily summaries from the *Record of Climatological Observations*.
- *Climate Normals*, which are the average values of meteorological data, such as temperature, precipitation, frost/freeze data, and snowfall data, over 30 years. The normal climate helps describe the climate and is used as a base to which current conditions can be compared.
- Publications, including *Storm Data* (provides monthly reports of damaging weather), *Local Climatological Data* (provides a monthly summary of daily observations), *Climatological Data* (provides annual average values), and *Comparative Climatic Data* (provides average and extreme values).
- *Automated Surface Observations System (ASOS) 1-Minute Surface Data*, which is meteorological data collected minute-by-minute, including air temperature/dew point, wind speed and direction, visibility, cloud height, cloud layer thickness, pressure, and precipitation accumulation.
- CD-ROMs/DVDs, such as the *International Station Meteorological Climate Summary*, which contains climatic data summaries from thousands of weather stations around the world, and the *Integrated Surface Data* database, which contains hourly weather data for about 10,000 weather stations, with some information dating back as far as 1901.

Ongoing communication is important to ensure that the information that NCDC provides is appropriate and applicable to legal sector needs. As climate changes in the years ahead and the effects become more noticeable, new information needs will emerge. NCDC will work closely with this sector, attending trade meetings and sponsoring future workshops and conferences, in order to better understand, address, and anticipate these needs.

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NOAA's National Climatic Data Center User Engagement Fact Sheet Sector: **Marine and Coastal Ecosystems**

OVERVIEW

Marine and coastal ecosystems include estuaries and coastal waters and lands. Within these systems are sensitive habitats, marine sanctuaries, national parks, aquaculture, fisheries, and tourism activities. Informed and responsible stewardship of natural marine and coastal resources is critical to the survival of the many threatened and endangered species living within these ecosystems. Coastal and marine ecosystems are intimately linked to climate. Biodiversity and ecosystem health are directly related to surrounding environmental conditions and are sensitive to atmospheric conditions. Both rapid and gradual climate changes and variations can strongly impact natural ecosystems and the economies that depend on this environment. In order to develop appropriate adaptation and mitigation strategies, it is important to have information on how weather and climate trends affect ecosystems, local communities, regulatory requirements, and day-to-day operations.



KEY STAKEHOLDERS

NOAA's National Climatic Data Center (NCDC) works with various groups, both as an information provider and as an applied research partner, to examine the effects of weather and climate on marine and coastal ecosystems. This type of information can help decision makers and planners in both public and private entities within this sector determine practical responses to climate change and variations. There are many different governmental and non-governmental organizations, public and private groups and businesses, and individuals that can benefit from using pertinent climate and weather-related information. Some major groups include:

- International, federal, state, regional, and local governments
- Aquaculture and coastal agriculture businesses
- Government, commercial, and sport fisheries
- Academia and other researchers
- Tourism groups and businesses
- Transportation departments and businesses
- Gas, oil, and renewable energy industries



SECTOR NEEDS

Climate information is often available only as raw observations or in the form of tables, graphs, or written summaries, which may be difficult for users who are not well-versed in climate science to fully interpret. To bridge this gap, NCDC is partnering with the marine and coastal ecosystems sector to translate climate data into accessible, useful, and accurate products; and to leverage NCDC's climate expertise to better understand what the information means and how it can be used most effectively.

Climate information can be used in a variety of ways. Some examples include:

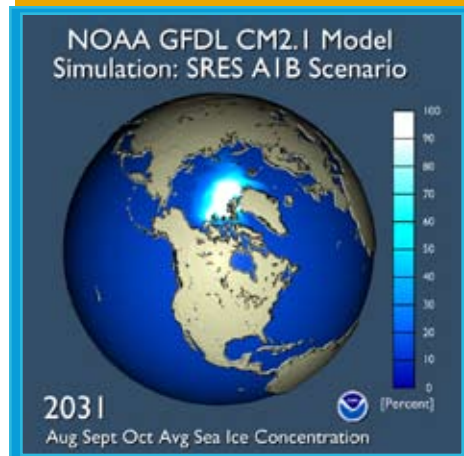
- Using sea surface temperature data to determine the impact on the distribution, mobility, and health of many aquatic species.
- Using sea-level rise and storm surge data to assess the exposure or inundation of sensitive coastal ecosystems.
- Using precipitation data over land to examine and analyze near-shore sediment deposition and changes in water chemistry, such as salinity.
- Using climate data related to frequency, intensity, and duration of extreme climate events, such as hurricanes, to assess potential mitigation and adaptation strategies.
- Using long-term climate data to help identify and understand factors, such as warming ocean temperatures, that threaten the health of the coral reef ecosystem.



NCDC DATA AND PRODUCTS

There are many different types of useful climate information available. Some examples include:

- Satellite-based *Coral Bleaching Products*, which include nighttime-only sea surface temperatures, sea surface temperature anomalies, regions of extreme warm water that can be harmful to reefs (called hotspots), and degree heating weeks, which indicate the thermal stress experienced by coral reefs.
- Marine observations made at fixed surface locations, both unmoving and drifting buoys, and on ships.
- *Sea ice* chart information and database, which provides sea ice extent.
- The *Global Historical Climate Network*, which contains historical temperature, precipitation, and pressure data for thousands of land stations around the world.
- CD-ROM/DVDs, such as the *Integrated Surface Data* database, which contains climate information for about 10,000 weather stations, with some dating as far back as 1901.
- Global tropical cyclone positions and intensities in the *International Best Track Archive for Climate Stewardship* (IBTrACS) tropical cyclone database.
- Oceanic data satellite observations, which provide data on sea surface winds, sea surface temperatures, wave heights, ocean color, internal waves, sea ice features, and ocean topography.



Collaboration between climate scientists and the coastal and marine ecosystems community is essential in helping to build the necessary bridges that will transform climate science into information that is relevant and credible. Ongoing communication is important to ensure that the information NCDC provides is appropriate and applicable to coastal and marine ecosystems sector needs. As climate changes in the years ahead and the effects become more noticeable, new information needs will emerge. NCDC will work closely with this sector, attending trade meetings and sponsoring future workshops and conferences, in order to better understand, address, and anticipate these needs.



Additional details about available NOAA products and the economic benefits of these products are provided at:

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For further information on obtaining NCDC climate services and products related to coastal and marine ecosystems, please contact:

Customer Services Branch

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NOAA's National Climatic Data Center User Engagement Fact Sheet Sector: **TOURISM**

OVERVIEW

Tourism in the United States generates hundreds of billions of dollars every year from domestic and international travelers and employs more workers than any other industry. Weather and climate conditions at a particular locale

are a major decision factor for tourists. Many local and regional tourist destinations have, over many years, cultivated a reputation for certain activities or expectations that are mainly based upon the local climate. Florida is known for its sunshine and warm beaches, while Vermont is known primarily for its autumn foliage and winter skiing. Thus, this sector is highly sensitive to changes in weather and to the impacts of a changing climate. If climate conditions change over time, it will likely impact existing tourist industries. Having access to relevant climate information is essential to understanding how weather patterns and climate trends influence the tourism industry and to effectively plan for the future.



KEY STAKEHOLDERS

NOAA's National Climatic Data Center (NCDC) works with various groups, both as an information provider and as an applied research partner, to examine the effects of weather and climate on tourism. This helps decision makers within the tourism sector determine practical and profitable responses to climate changes and variations. There are many different governmental and non-governmental organizations, public and private groups and businesses, and individuals that can benefit from using pertinent climate and weather-related information. Some major groups include:

- Commercial passenger transportation carriers
- Federal, state, regional, and local governmental planning, commerce, and marketing agencies
- Accommodations operators and managers, such as hotels, motels, and vacation rentals
- The food service industry, such as restaurants and restaurant supply companies
- Travel planners and agencies
- Cultural event planners
- The sporting event industry, such as football, baseball, and the Olympics
- Weather-dependent tour operations and recreation industries, such as ski resorts and diving companies



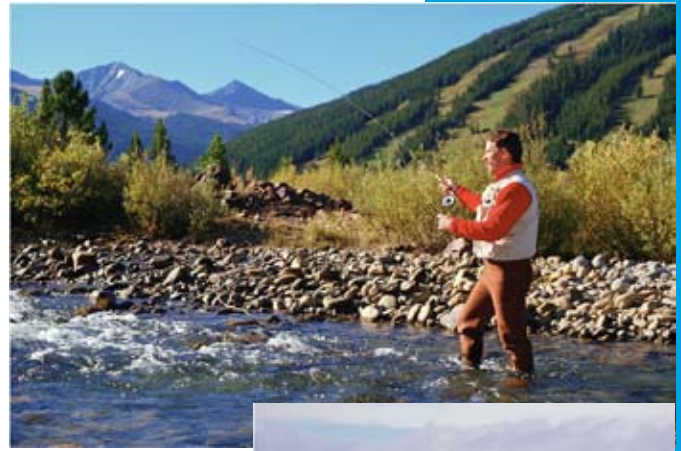
SECTOR NEEDS

Climate information is often available only as raw observations or in the form of tables, graphs, or written summaries, which may be difficult for users who are not well-versed in climate science to fully interpret. To bridge this gap, NCDC is partnering with the tourism sector to translate climate data into accessible, useful, and accurate products; and to leverage NCDC's climate expertise to better understand what the information means and how it can be used most effectively.

Climate information can be used in a variety of ways.

Some examples include:

- Using temperature data and information on increased frequency, duration and intensity of heat waves to determine how much outdoor recreation at summer tourist destinations may be reduced.
- Using precipitation information to understand how changes in river and lake levels may affect fishing and boating industries.
- Using drought information to plan for watering the greens and fairways at golf courses.
- Using snow cover extent and temperature trends to determine the optimal locations to build new ski lifts, which have about a 25-year lifespan.



NCDC DATA and PRODUCTS

There are many different types of useful climate information available. Some examples include:

- The *Global Historical Climate Network*, which contains historical temperature and precipitation data for thousands of land stations around the world.
- Local climatic averages, such as temperature, precipitation, winds, and sunshine.
- Satellite-based *Coral Bleaching Products*, which include regions of extreme warm water that can be harmful to reefs (called hotspots), and degree heating weeks, which indicate the thermal stress that coral reefs experience.
- The *U.S. and North American Drought Monitor*, which are synthesis products of multiple indices and impacts that represent a consensus of federal and academic scientists.
- Satellite-based snow cover extent products.
- The *Integrated Surface Data* database, which contains climate information for about 10,000 weather stations, with some dating back as far as 1901.



Collaboration between climate scientists and the tourism community is essential in helping to build the necessary bridges that will transform climate data into information that is relevant and credible. Ongoing communication is important to ensure that the information NCDC provides is appropriate and applicable to tourism sector needs. As climate changes in the years ahead and the effects become more noticeable, new information needs will emerge. NCDC will work closely with this sector, attending trade meetings and sponsoring future workshops and conferences, in order to better understand, address, and anticipate these needs.



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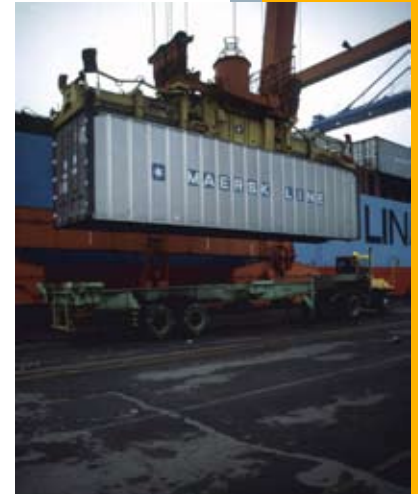
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NOAA's National Climatic Data Center User Engagement Fact Sheet Sector: **TRANSPORTATION**

OVERVIEW

Transportation by trains, aircraft, automobiles, trucks, ferries, barges, ships, and pipelines is a fundamental component of the U.S. economy. Adverse and extreme weather events and climate change and variations can affect these systems and have significant impacts on society. Adverse weather conditions such as storms, icing, high winds, and poor visibility have immediate effects on day-to-day operations, often disrupting large portions of a transportation network. Extreme weather events such as floods, droughts, hurricanes, and tornadoes also have immediate effects, disrupting transportation and creating large clean-up and rebuilding costs. Expected climate change and variations, such as increasing temperatures, a growing number of droughts and floods, more intense hurricanes and precipitation events, and rising sea level, have long-term impacts on all aspects of transportation. In order to develop appropriate planning, response, and adaptation strategies, it is important to have information on how weather and climate trends affect the various modes of transportation.



KEY STAKEHOLDERS

NOAA's National Climatic Data Center (NCDC) works with various groups, both as an information provider and as an applied research partner, to examine the effects of weather and climate on transportation. This type of information can help engineers and decision makers within the transportation sector make practical decisions in order

to adapt to climate changes and extreme weather conditions and to mitigate possible effects. There are many different governmental and non-governmental organizations, public and private groups and businesses, and individuals that can benefit from using pertinent climate and weather-related information. Some major groups include:

- National and international governmental transportation agencies and authorities
- Federal, regional, state, and local governmental transportation authorities
- Commercial passenger carrier operations, such as air, rail, road, and maritime
- Commercial operations, such as interstate trucking companies, express delivery, and energy companies
- Storage, transfer, and warehousing enterprises
- Transportation planning and research organizations

SECTOR NEEDS

Climate information is often available only as raw observations or in the form of tables, graphs, or written summaries, which may be difficult for users who are not well-versed in climate science to fully interpret. To bridge this gap, NCDC is partnering with the transportation sector to translate climate data into accessible, useful, and accurate products; and to leverage NCDC's climate expertise to better understand what the information means and how it can be used most effectively.

Climate information can be used in a variety of ways. Some examples include:

- Using precipitation and visibility data to determine how often traffic-slowing weather conditions occur in different locations.
- Using climate data related to frequency, intensity, and duration of extreme climate events, such as hurricanes or tornadoes, to plan for potential storm impacts and to assess potential adaptation and/or mitigation strategies.
- Using average and extreme temperature and precipitation information to plan for road construction.
- Using precipitation intensity and frequency probabilities to plan for stormwater drainage systems.
- Using tide gauge data to evaluate local sea-level rise and its potential impacts on transportation in low-lying coastal regions and on maritime traffic under bridges.



NCDC Data and Products

There are many different types of useful climate information available. Some examples include:

- *Wind Rose* tabulations, which provide statistical summaries of wind speed versus wind direction from hourly data, produced in cooperation with the Federal Aviation Administration.
- The *U.S. and North American Drought Monitor*, which synthesizes products of multiple indices and impacts, representing a consensus of federal and academic scientists.
- The *Integrated Surface Data* database, which contains climate information for about 10,000 weather stations, with some dating as far back as 1901.
- Publications, including *Local Climatological Data* (provides a monthly summary of daily observations), *Climatological Data* (provides annual average values), and *Comparative Climatic Data* (provides average and extreme values).



Collaboration between climate scientists and the transportation community is essential in helping to build the necessary bridges that will transform climate data into information that is relevant and credible. Ongoing communication is important to ensure that the information NCDC provides is appropriate and applicable to transportation sector needs. As climate changes in the years ahead and the effects become more noticeable, new information needs will emerge. NCDC will work closely with this sector, attending trade meetings and sponsoring future workshops and conferences, in order to better understand, address, and anticipate these needs.

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NOAA Satellite and Information Service
National Environmental Satellite, Data, and Information Service (NESDIS)

National Climatic Data Center (NCDC)

U.S. Department of Commerce



NOAA's National Climatic Data Center User Engagement Fact Sheet Sector: **WATER RESOURCES**



OVERVIEW

Water is a fundamental component of life and water resources are directly dependent on climate. Climate change is altering the water cycle, affecting where, when, and how much water is available. Extreme weather events such as droughts and heavy precipitation, which are expected to increase as climate changes, can significantly impact water resources.

A lack of adequate water supplies, an overabundance of water, or degraded water quality has a substantial influence on civilization—now and throughout history—affecting the economy, energy production and use, human health, transportation, agriculture, national security, natural ecosystems, and recreation. Providing access to relevant climate information is essential to understanding how weather patterns and climate trends influence water resources and to developing appropriate planning, response, and adaptation strategies.



KEY STAKEHOLDERS

NOAA's National Climatic Data Center (NCDC) works with various groups, both as an information provider and as an applied research partner, to examine the effects of weather and climate on water resources. This helps decision makers within the water resources sector determine practical responses to climate changes and variations. There are many different governmental and non-governmental organizations, public and private groups and businesses, and individuals that can benefit from using pertinent climate and weather-related information. Some major groups include:

- Federal, state, regional, county, and city water managers
- State drought task forces and water resources agencies
- Federal agencies, such as NOAA, U.S. Geological Survey, U.S. Dept. of Agriculture, U.S. Environmental Protection Agency, U.S. Army Corp of Engineers, National Park Service, and the Federal Emergency Management Agency
- Federal, state, regional, and local planners
- Industry, such as agriculture, transportation, energy, and recreation
- Academia and other researchers



SECTOR NEEDS

Climate information is often available only as raw observations or in the form of tables, graphs, or written summaries, which may be difficult for users who are not well-versed in climate science to fully interpret. To bridge this gap, NCDC is partnering with the water resources sector to translate climate data into accessible, useful, and accurate products; and to leverage NCDC's climate expertise to better understand what the information means and how it can be used most effectively.



Climate information can be used in a variety of ways. Some examples include:

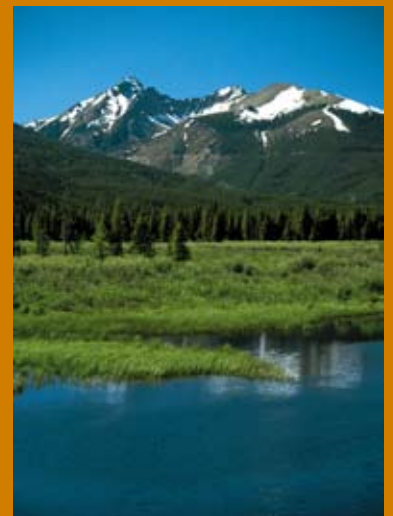
- Using short-duration rainfall values and rain gauge charts to design retarding basins that will help reduce stormwater-borne pollutants.
- Using the amount, location, and duration of rainfall from a heavy precipitation event to define the magnitude of a storm in order to assess and estimate property damage.
- Using drought information to determine when water rationing may be required in areas where lake levels are declining.
- Using temperature and snowpack trends to determine changes in the timing of runoff. Warmer temperatures cause snowpack to melt earlier in the spring, causing lower streamflow later in the summer.

NCDC Data and Products

There are many different types of useful climate information available. Some examples include:

- The *Global Historical Climate Network*, which contains historical temperature and precipitation data for thousands of land stations around the world.
- Summaries produced from data, such as temperature and precipitation frequency distributions.
- The *U.S. and North American Drought Monitor*, which synthesizes products of multiple indices and impacts, representing a consensus of federal and academic scientists.
- The *National Integrated Drought Information System*, which is a web portal-based multi-agency collaborative system that provides information about current drought conditions and impacts, and drought forecasts, planning, education, and research.
- *United States Snow Climatology*, which includes daily, monthly, and seasonal snowfall and snow depth across the United States.
- Publications, including *Local Climatological Data* (provides a monthly summary of daily observations), *Climatological Data* (provides annual average values), and *Comparative Climatic Data* (provides monthly average and extreme values at hundreds of local stations).

Collaboration between climate scientists and the water resources community is essential in helping to build the necessary bridges that will transform climate data into information that is relevant and credible. Ongoing communication is important to ensure that the information NCDC provides is appropriate and applicable to water resource sector needs. As climate changes in the years ahead and the effects become more noticeable, new information needs will emerge. NCDC will work closely with this sector, attending trade meetings and sponsoring future workshops and conferences, in order to better understand, address, and anticipate these needs.



Additional details about available NOAA products and the economic benefits of these products are provided at:
<http://www.economics.noaa.gov>

For further information on obtaining NCDC climate services and products related to water resources, please contact:
Customer Services Branch
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