

Idaho Climate-Economy Impacts Assessment

Key Findings

Idaho's climate is changing.

Idaho is projected to experience increasing temperatures, changes in precipitation and decreasing snowpack.

Precipitation patterns will vary across the state. There likely will be increasing precipitation in the winter and early spring, mainly in the form of rain, as well as decreasing summer precipitation.

An increase in rain-on-snow events is likely. Rain on top of snow leads to increases in floods and land/mudslides.

Idaho will experience increases in extreme weather events, including drought, floods and wildfires.

Changes in climate will impact Idaho's major economic sectors.

Agriculture

Key Messages:

- Climate variables – temperature, precipitation and snowpack – are linked with agricultural production, including crop yields.
- Peer-reviewed literature shows that projected changes in climate variables will have different effects on different crops. Some crops, such as onions, are more sensitive to changes in temperature than are others, such as grains.
- Changes in surface water and groundwater availability (as influenced by snowpack levels, associated runoff flows and timing and water management decisions) and producer responses to shifting water availability likely will influence the performance of agriculture in Idaho over the coming decades.
- Idaho farmers and their partners already are demonstrating ingenuity and leadership, experimenting with and adopting new practices to help mitigate risks associated with the changing climate.

Opportunities:

- Additional water storage and water recharge may be needed to capture increased water runoff in the winter and early spring to prevent flooding and to augment irrigation storage. This can help meet water use demand and offset water shortages in the warmer months.
- Opportunities to reduce water use include:
 - Improving current irrigation system efficiency.
 - Managing irrigation timing to coincide with crop needs
 - Adjusting crop rotations.
 - Planting new seed varieties that need less water.
 - Improving soil health to increase water retention.
- Shifting to crops/species that are more tolerant of disease and increasing temperatures. Systems in locations with climates similar to those projected for Idaho may provide insight into adaptation strategies, such as potato storage systems in Germany.

Energy

Key Messages:

- Changes in temperature, precipitation and snowpack impact Idaho's energy resources.
- Increasing temperature and a growing population will increase summer energy demand, the highest demand season in Idaho. Demand increases may vary in magnitude across the state.
- Decreasing summer streamflow will impact hydropower generation, the main source of Idaho's electricity. Additional storage capacity maybe needed to accommodate increased spring streamflow and decreased summer streamflow.
- As coal and petroleum are phased out to meet clean energy goals, additional transmission capacity and alternative firm energy sources, such as nuclear, likely will need to be expanded.
- The extension and modernization of electrification is one of the most anticipated, but also challenging, changes to the current energy system. Electrification can allow for cleaner (and even zero-carbon) transportation and heating; it has the potential to lower long-term costs compared to technologies using other types of fuels.

Opportunities:

- Increasing generation through renewable, intermittent resources like solar and wind would not only reduce carbon emissions and reduce the feedback from energy to the climate, but also can create jobs and economic growth.
- Idaho National Laboratory (INL) and other national laboratories are exploring the development of clean and economically competitive nuclear energy options. As well, INL and other national laboratories are researching enhanced energy storage capabilities, which would relieve some of the major challenges associated with increased electrification.
- Energy-related jobs likely will increase in number as the state's energy sector evolves with the changing climate and economic needs.

Human Health

Key Messages:

- Poor air quality due to wildfire smoke and high temperatures are the most widespread direct and indirect impacts of climate change on Idahoans' health. Many indirect impacts exist that affect wellbeing, productivity, life expectancy and economic health.
- Other climate-related health impacts include vector-borne disease, decreased water quality and quantity, harmful algal blooms, food safety and food insecurity, mental health and others.
- Idahoans will not experience health-related economic impacts of climate change uniformly. Idaho's geographical diversity and differences in population density, infrastructure, income, access to health and human services, age, health status and more all will influence how human health will be affected.
- Climate change-related health impacts disproportionately affect the elderly, the young, pregnant women, individuals with chronic diseases and disabilities and people who lack health care access and economic resources. Outdoor workers, such as those employed in agriculture, construction and public safety, face greater vulnerability to smoke and temperature extremes.
- Tribal populations face particular climate-related health vulnerabilities due to loss of natural resources, physical displacement and First Food and economic losses, all of which impact essential spiritual and cultural practices.

Opportunities:

- Health practitioner training that incorporates information on health risks connected to the changing climate can help reduce health care costs and support a strong economy.
- Further study on health and economic data connected to hospital admissions, emergency room visits, emergency transport clinic visits and insurance can expand understanding of climate exposures on health and the economy at local and state levels.

Opportunities Cont.:

- Emergency preparedness planning can incorporate climate change, helping healthcare systems prepare for likely events and health risk changes.

Infrastructure

Key Messages:

- Idaho's infrastructure likely will be impacted by climate change and climate change-related weather events.
- Infrastructure systems – such as transportation, water and energy – are connected. Weather-related disruptions in one system often cascade into others, which can greatly increase the economic impact of a disruption. The integrity of the entire infrastructure system hinges on the strength of the most vulnerable link.
- In the short-term, climate change impacts on infrastructure in Idaho mostly will be caused by weather-related events, such as avalanches, land/mudslides and wildfires.
- In the long-term, climate change may require Idaho's infrastructure providers to redesign facilities, operations and models based on a different climate regime.

Opportunities:

- Adapting to design standards, modifying operations and routine maintenance can prevent critical infrastructure disruptions.
- With models that consider future climate conditions, infrastructure providers can increase efficiency of facilities, operations and maintenance.
- Reliable access to communication, energy, transportation and water services for rural communities is important, particularly with increases in weather-related events. Microgrids are one option that enhance local resilience to increasing weather-related events and protect critical community electricity infrastructure.

Land: Forests

Key Messages:

- Climate affects Idaho's forests through temperature and precipitation. Idaho's forests have warmed in the last few decades and projected future climate change suggests continued warming, as well as greater annual precipitation and reduced summer precipitation.
- How Idaho's trees respond to climate change will vary depending on species and location. For example, some lower elevation trees will respond less favorably to hotter, drier conditions while trees at higher elevations will experience more favorable conditions associated with warming and longer growing seasons. Because understanding of future precipitation and tree response is limited, the changes in Idaho's trees are uncertain.
- Recent climate conditions have led to widespread and severe forest disturbances in Idaho. For example, wildfires and bark beetles benefit from warmer, drier conditions. Future climate change will lead to more frequent and severe disturbances, affecting tree growth and survival. Climate change and enhanced disturbances may lead to increased susceptibility of forests to disturbances and reduce their ability to recover.
- Climate change will impact ecosystem services provided by forests, including timber, recreational opportunities and habitat for other species.

Opportunities:

- Forests hold potential to provide “natural climate solutions,” solutions for reducing future climate change using natural ecosystems. Tree growth removes carbon from the atmosphere and sequesters a portion in stems, branches, leaves and roots.
- Opportunities exist for Idaho forests to help reduce (mitigate) future climate change. Idaho forests could be used in carbon offset projects in existing carbon markets while still allowing for traditional forest uses. Management actions can help humans and other species adapt to future climate change.
- Enhancing a forest’s ability to absorb climate change-related stress may be possible through minimizing other stressors, such as wildfires and insect and pathogen outbreaks.

Land: Rangelands

Key Messages:

- Wet winters and warmer, drier summers may decrease forage available during summer months, resulting in the need to adjust turnout dates. Feed crops harvested for later use, such as hay or alfalfa, also may decline due to hotter, drier growing conditions and reduced water availability.
- Warmer temperatures may cause animal heat stress and require additional resources, such as making additional water available for livestock and animal use. Both wildfire and (invasive) annual grasses can impact yearly livestock grazing rotations, stocking rates and rangeland management.
- Increasing precipitation and temperature variability can increase costs for livestock operations.
- Changes in temperature and precipitation may alter demand for recreational usage of rangelands. These changes will test the capacity of public lands and infrastructure to accommodate shifting recreational demands.
- Drought and wildfire may impact the availability of wildlife habitat, affecting bird and wildlife viewing and hunting. Wildfires, restoration efforts and loss of species habitat may mean area closures to recreational and grazing use.

Opportunities:

- Managers can aim to keep rangelands productive and look for opportunities to restore degraded rangelands. Converting degraded rangelands and croplands back to productive native rangelands with healthy perennial grasses has the potential to sequester atmospheric carbon.
- Work with local weed management cooperatives or Rangeland Fire Protection Associations to address risks from weeds and wildfires.
- Decision-support tools, such as RangeSAT, which tailor information on weather and forage for rangeland users, have the potential to help ranchers and others adapt to climate change.
- Identify alternative forage sources in case of drought and consider altering class or breed of livestock to those better adapted to future climate conditions.
- Revise restoration and management plans to account for new climate conditions. Adaptive management strategies and proactive management decisions will be necessary to improve rangeland sustainability and resilience.

Recreation and Tourism

Key Messages:

- Idaho has a substantial and growing tourism industry, largely based on the outdoor recreation opportunities provided by land, lakes and rivers. Climate change is likely to influence the economic risks and opportunities this sector experiences and affect the overall well being of Idahoans who engage in recreation and tourism.
- Smoke from wildfires and high temperatures impacts motorized and non-motorized visitation and use of public lands and poses health risks to humans and wildlife.
- Changes in precipitation and warmer air temperatures affect water temperature and streamflow. This puts fish species and fisheries at risk, impacting both revenue from recreational fishers and revenue for outfitters and guides.
- Across the state, the amount of time that snow covers the ground has decreased and, in many locations, ski and snowmobile seasons are projected to grow shorter with decreasing snow quality throughout the 21st century.

Opportunities:

- Closures and delays are likely to increase and be more pronounced at lower elevation winter resorts, with higher elevation winter resorts potentially experiencing an increase in visitation. While declines in snowpack generally have negative effects for Idaho's ski resorts, some resorts already have taken steps to adapt to changing conditions. Resorts are making their own snow and diversifying their year-round revenue streams. Examples include offering expanded summer recreational activities, such as hiking and biking trails; providing conference space and holding concert series. With increasing demand for summer outdoor activities, Idaho resorts have the opportunity to offset potential declines in winter revenue.
- There may be opportunities to attract winter sport enthusiasts from areas of the country more severely affected by the changing climate. Idaho could attract tourists from states like Vermont, where snow-based activities are becoming less available.
- While extreme heat and smoke may reduce the number of recreators boating, camping, fishing, hiking, off-roading and more in the summer, these losses may be offset by increased participation in spring and fall months. Communities that develop tourism adaptation strategies and anticipate these changes may be able to capitalize on changing visitation patterns.

