

Key Principles for Adapting Farms, Ranches, & Forests to Extreme Weather and Variable Climate

Extreme Weather and Climate Variations

Extreme weather is on the rise across the country. Heavy downpours have increased dramatically in some regions while others are seeing more intense drought. Winters have become warmer, leading to greater weed and pest survival, and shifts in seasons increase uncertainty in decision-making.

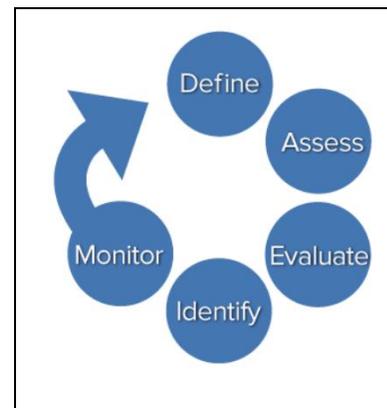
What is Adaptation?

Adaptation is a process of natural or human response to both challenges and opportunities. In this case, the challenges and opportunities are created by a wider potential for extreme weather, regional changes in temperature or rainfall, and increased uncertainty of future climatic conditions. Managers of farms, ranches, and forests can be proactive and take adaptive actions to respond to disruptions caused by weather or climate related stress, disturbance, and disasters or to take advantage of potential opportunities from gradual changes.

Farmers and private lands managers have always adjusted to sustain operations, maintain or improve productivity, increase profitability, and provide resource stewardship services in the face of changes in market conditions, input costs, neighbor relations, labor shortages, pest invasions, and adverse weather. Such adaptive actions reduce risks from loss as well as enhance the resilience of systems to absorb potential disruptions.

The 5-Step Process of Adapting to Change

The 5-step process of adapting to impacts of extreme weather and variable climate is comparable to addressing other threats and opportunities. It begins with defining current goals and objectives. The next step assesses potential impacts in the climate region. These impacts are incorporated as an additional “filter” through which to critically evaluate goals and objectives. Once appropriate adaptive actions are identified, monitoring and evaluation are used to determine if expected outcomes are being achieved. This flexible process draws upon locally relevant information resources about anticipated climate impacts on the farming, ranching, or forestry system.



A New Perspective: Principles of Adaptation

Agricultural producers and forestry practitioners need more information to adjust to extreme weather and climate impacts. However, a **new perspective** can be as important as information. The following principles serve as a starting point for this adaptation perspective:

- Setting priorities and taking intentional actions to address the most vulnerable resources
- Taking precautionary actions where vulnerability is high to reduce near-term risk
- Being flexible and creative in developing contingencies and options to maintain or transform the operation
- Continuously learning through an iterative process of adaptive management that incorporates new knowledge and experience through time

- Looking for feasible, “no-regret” actions that result in a variety of co-benefits towards multiple goals with little or no risk
- Considering both short- and long-range time frames that include steady adjustments to reduce existing impacts and strategies for expected larger impacts
- Considering a reduction in greenhouse gas emissions or storing carbon from the atmosphere. These additional actions help society reduce atmospheric greenhouse gases causing climate disruptions and the cost of adaptation for future generations.

Why is Adaptation Important?

A producer or forestry practitioner needs to understand the science-based rationale behind their decisions and actions to sustain an operation's production, profits, and stewardship under more extreme weather and seasonal climate variations. The 5-step process helps the producer make climate-informed decisions that connect the effects of specific on-farm actions back to broad strategies and intent. This way, management can overcome weather and climate related challenges or take advantage of opportunities, meeting the operation's goals and objectives.

Resources and Tools for Making Climate-Informed Decisions

The [Adaptation Workbook](https://adaptationworkbook.org/) is a website (<https://adaptationworkbook.org/>) that can help decision-makers organize information in a self-guided, step-by-step manner. The workbook helps producers connect monitoring data back to planned actions as well as the risks, vulnerabilities, or opportunities they address. To facilitate each of the 5 steps, producers gather the following information about their operation, climate region, and known adaptation responses:

<u>Step</u>	<u>Resource or Tool</u>
Define	Business and conservation plans
Assess	Local weather and climate impact assessments vulnerabilities and risk
Evaluate	Decision Support Tools
Identify	A Menu of adaptation strategies and approaches Locally relevant tactics for each broad response
Monitor	Tools to track effectiveness of actions and adjust

Where Can I Learn About Climate Impacts, Vulnerabilities, and Risks?

General climate change effects on agriculture and natural resources already observed and anticipated are summarized in USDA Technical Bulletin 1935 [Climate Change and Agriculture in the United States: Effects and Adaptation](#). Many other resources exist that assess impacts, vulnerabilities, and risks on global, national, regional, and state scales. To identify locally and industry relevant resources, contact your nearest [USDA Regional Climate](#)

[Hub](#). USDA Climate Hubs not only organize agency resources, but also provide access to University scientists and other partners engaged in providing education about climate science, weather variability, and the effects of climate change on working lands.

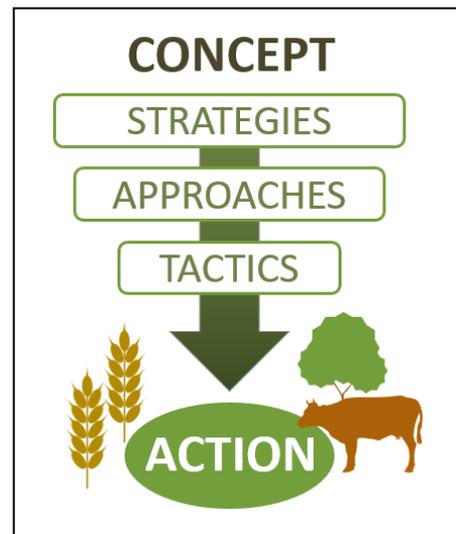
Where Can I Learn About Potential Adaptations and Rationale?

USDA Climate Hubs and their University and other partners also provide resources about known adaptive actions. Several resources offer a menu of adaptation options for producers to consider. Adaptation menus organize on-the-ground (farm and landscape scale) example tactics under various approaches. These approaches may also consist of broad strategies commonly applied across systems and landscapes.

For more information, see the [adaptation workbook](#) website or these publications:

["Adaptation Resources for Agriculture: Responding to Climate Variability and Change"](#)

["Forest Adaptation Resources: climate change tools and approaches for land managers, 2nd edition"](#)



Ultimately, specific adaptive actions must be developed to meet individual needs that consider the crop, livestock, or forestry system, site conditions, landowner goals, manager objectives, legal, market, and all other factors unique to the operation.