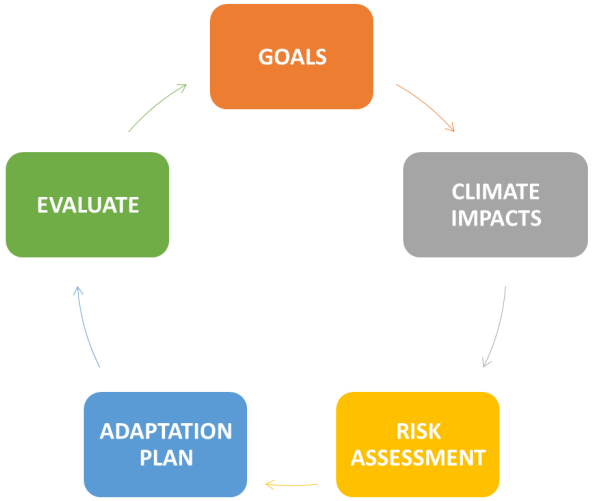
Climate Adaptation Planning for Farms

American Farmland Trust
SAVING THE LAND THAT SUSTAINS US

Start planning for climate adaptation and farm resilience, based on the unique variables of your land and operation.

Five steps for farmland climate adaptation planning:

1. Define your farm goals and priorities
2. Identify specific, observed climate impacts
3. Conduct a risk & vulnerabilities assessment based on your climate impacts and farm goals
4. Develop a set of adaptation practices
5. Evaluate the effectiveness of those adaptations practices and update your plan accordingly



Version 3, Feb 2024. This approach was adapted by Julie Fine from Adaptation Resources for Agriculture: Responding to Climate Variability and Change in the Midwest and Northeast. USDA Midwest, Northeast, and Northern Forests Climate Hubs, 2016.

1. Goals *What are the overall or immediate goals of your farm operation?*

Articulate one to three goals that inform your choices and priorities. *Consider foundational values, financial requirements, farm resources, aspirations, challenges, etc.*

2. Climate Impacts *What impacts of climate change have you observed and experienced on your farm?* Check all that apply. **Circle the most concerning impacts.**

Changing precipitation patterns

- ☐ Wetter springs or falls
- ☐ More frequent extreme precipitation
- ☐ Saturated soils affecting planting, weeding, and/or harvest
- ☐ Seasonal drought
- ☐ Increased need for irrigation
- ☐ Decreased pasture/forage yield

Increased temperatures

- ☐ Increased seasonal temperatures
- ☐ More extreme temperatures
- ☐ Changing pest or disease patterns
- ☐ Increased weed vigor
- ☐ Increased cooling needs
- ☐ Heat stress
- ☐ Animal health declines

Extreme weather

- ☐ Flooding and/or ponding
- ☐ Increased erosion
- ☐ Nutrient leaching
- ☐ High wind effects
- ☐ Infrastructure damage due to wind, snow, rain, or temperatures
- ☐ Wildfire frequency or size increases

Seasonal shifts

- ☐ Wetter spring/fall
- ☐ Unpredictable frosts, fruit loss
- ☐ Warmer winter/summer
- ☐ Changes in timing of planting/harvest
- ☐ Crop or variety not adapted
- ☐ Pollination mismatches

Other (write in)

Projected Changes in Weather in the Northeast for mid-century (2041-2070 average)

ANNUAL TEMP	ANNUAL PRECIPITATION	GROWING SEASON	HOT DAYS	HOT SPELLS	COLD DAYS	EXTREME PRECIPITATION
+ 4 to **8 F**	**+ 1** to **7 inches**	**+ 19** to **27 days**	**+ 3** to **21 days**	**+ 1** to **7 days**	**- 6** to **24 days**	**+ 2** to **4 days**
Avg temp increases, and increases in each season. Milder winters	Seasonal increase greatest in winter Decrease in summer	Warmer, wetter springs	Least change in northernmost areas	Increase in consecutive days over 95	Greatest decrease in the north	More days of precipitation exceeding 1"

This table is adapted from the USDA Regional Climate Hubs' Regional Agricultural Vulnerability Assessment and the National Climate Assessment NESDIS reports using the A2 climate scenario. Growing season=the period between the last occurrence of 32° in the spring and first occurrence of 32° in the fall; hot days=annual average of days with max temp exceeding 95°; hot spells=max number of consecutive days with max temps over 95°; cold days=average annual number of days with min temp below 10°; freeze days=days with a min temp below 32°; extreme precipitation=number of days with precipitation over 1 inch.

3. Risks Assessment

Based on your observations of climate impacts, and taking into account projected changes in climate, **what are 4 major vulnerabilities of your farm operation?** *What areas of land, important crops, animals, or essential infrastructure are a priority to protect? What is at most risk? Where do the identified climate impacts directly impact your top farm goals?*

Mind map

Use this space to map out critical areas of the farm, or brainstorm the issues.

Now choose which vulnerabilities are the priority. Priority should be given to large financial risks, preventable losses, and long-term priorities that meet the goals of your farm. **Circle your top priority.**

Consider Adaptation Strategies and Possible Practices:

Review these strategies, and specific potential practices, for adapting to climate change. **Which one(s) would help address the risks and vulnerabilities that you've prioritized above? Circle the most relevant ones** *(or develop your own).*

Soil resilience

Prioritize soil health
- Reduce tillage to improve soil aggregation
- Maximize days in cover crop
- Increase soil organic matter

Increase water infiltration
- Reduce compaction
- Improve soil aggregation
- Address ponding

Increase water retention
- Increase soil organic matter
- Mulch, cover crop, tarp or keep surface residue

Nutrient management
- Anticipate potential nutrient runoff during heavy rains
- Use lower release fertility
- Supplemental fertility in response to precip

Water management

Reduce severity of flooding
- Slow & catch water
- Plan ahead if you know fields regularly food
- Permanent beds

Manage water flow
- Prevent erosion
- Channel water away from row crops
- Create swales or grassy strips
- Keyline plow
- Improve drainage from fields, roads, greenhouses
- Grade farm roads

Anticipate flooding
- Reduce compaction
- Install tile drainage
- Have dry storage for equipment & inputs

Prepare for drought
- Improve irrigation equipment
- Use sensors for efficient irrigation

Diversification

Crop production
- Split production between high tunnel and field
- Increase diversity of crops
- Consider predicted seasonal changes in temp, precip, frost
- Diversify markets, farm revenue streams

Less risky crops
- Short DTM varieties
- Trial new varieties
- Add successions
- Reevaluate crops that will succeed in current or future conditions

Adjust for crop loss
- Plan for lower yields
- Trial new breeds, species, or varieties
- Increase number of successions

Crop/animal strategies

Maintain livestock health and performance
- Improve pasture
- Reduce heat stress (indoors & outdoors)
- Prevent emergent disease related to mud or heat

Manage impacts of pests & pathogens
- Trial new varieties or breeds
- Succession plantings
- Make alternative forage or feed plans
- Scout for pests (predictive models may be outdated)

Adjust crop plan
- Perennial plantings for spring
- Less risky crops
- Take at risk land out of production
- Plant valuable crops in safer fields
- Consider custom grazing or cropping

Infrastructure

Protected production
- High & low tunnels
- Shade cloth
- Wind breaks
- Permanent beds to water infiltration or flooding

Manage temperature
- Barn and greenhouse ventilation
- Optimize post-harvest cooling
- Climate controlled storage
- Shade/cooling for employees

Manage water
- Build ponds
- Install well
- Improve irrigation infrastructure (pipes, pumps, reels, redundancy)

Financial planning
- Financial cushion
- Crop insurance

Ecosystem integration

Diverse habitat
- Pollinator habitat
- Create riparian buffer zones

Manage farm as part of landscape
- Water flow
- Windbreaks
- Invasive species control
- Whole farm planning

Revaluate land
- Convert marginal crop land to permanent wetland, buffer or habitat
- Move location or infrastructure

Labor
- Sources of labor
- Housing
- Funding for projects

Risk:

Strategy:

Practice:

Risk:

Strategy:

Practice:

4. Adaptation Practices

Write down what you identified as your most significant risks *to climate impacts.*

Using ideas on the previous page, **note what strategies might be used to mitigate these risks?**

Consider what specific practices could serve to increase the resilience of your farm?

Remember that adaptive practices should include:

- Considerations of feasibility and potential effectiveness
- Flexible management that can adapt with new information
- "No regrets" decisions that will create broad benefits with little risk

Timeline and Considerations

⇒ What is a realistic time frame for developing these practices? How could they fit into your current systems?

⇒ What are possible funding sources or community support?

⇒ Have other people been successful with these practices? Ask about their experience.

5. Evaluate

Use tools like the NRCS In-Field Soil Health Assessment, soil health tests, forage yields, or other data to measure success.

Choose one or two criteria to measure the effectiveness of your climate adaptation practices. *What will indicate success? How often will you take that measurement?*

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In Summary:

This climate adaptation planning cycle should be repeated over time as new practices yield results, information is gathered, and new challenges emerge. Congratulations on getting started, and good luck with your climate resilience planning!

Primary References

Adaptation Resources for Agriculture https://www.climatehubs.usda.gov/sites/default/files/adaptation_ resources_workbook_ne_mw.pdf

Cultivating Climate Resilience on Farms and Ranches https://www.sare.org/content/download/80674/1415715/file/Cultivating Climate Resilience on Farms and Ranches.pdf

Five Step Guide to Farm Resilience https://regenerativefarmresilienceguide.org/

Building Soils for Better Crops www.sare.org/resources/building-soils-for-better-crops/

Managing Cover Crops Profitably https://www.sare.org/resources/managing-cover-crops-profitably-3rd-edition/

Websites and Resources

The Adaptation Workbook https://adaptationworkbook.org/

USDA Northeast Climate Hub www.climatehubs.usda.gov/hubs/northeast

U.S. Climate Resilience Toolkit https://toolkit.climate.gov/

Link to find local NRCS office https://offices.sc.egov.usda.gov/locator/app?agency=nrcs

NRCS Climate Smart Conservation Practices https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/climatechange/?cid=nrcseprd1881023

Tile Drainage Fact Sheet http://nmsp.cals.cornell.edu/publications/factsheets/factsheet57.pdf

Climate Adaptation for Vegetable and Flower Farms (webinar) https://www.johnnyseeds.com/growers-library/webinar/webinar-series-climate-adaptation-for-vegetable-and-flower-farms.html

UVM Climate Adaptation resource Database https://www.uvm.edu/climatefarming/about

UVM Farming Climate Change Program https://www.uvm.edu/extension/sustainableagriculture/farming-climate-change-program

Tarping in the Northeast https://extension.umaine.edu/publications/1075e/

Cornell Climate Smart Farming Program http://climatesmartfarming.org/

New England Adaptation Survey for Fruit and Vegetable Growers https://adaptationsurvey.files.wordpress.com/

Northeast Cover Crops Decision Tool https://northeastcovercrops.com/decision-tool/

Climate Adaptation Resources for Northern New England Farmers https://nefarmclimate.com/