

# Info

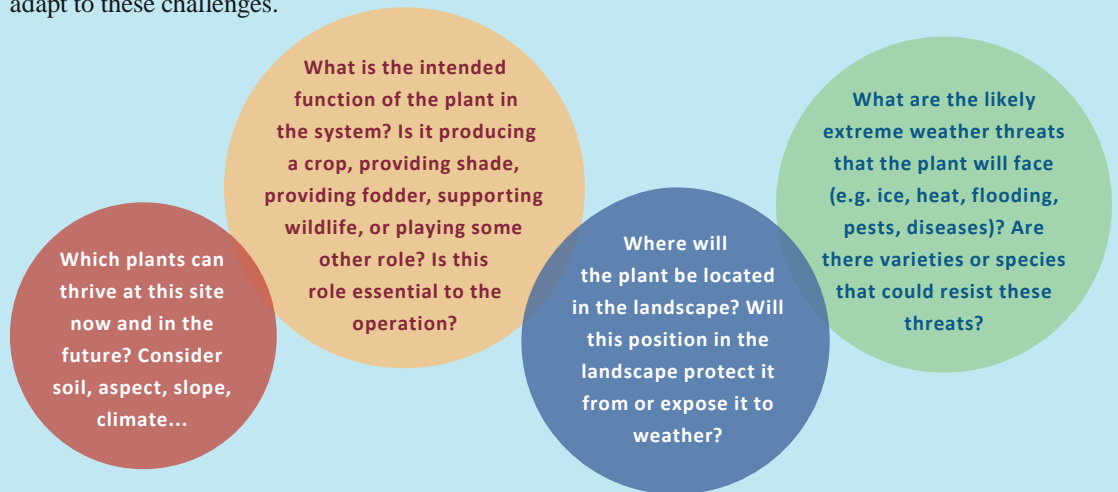
## How does climate variability influence agroforestry plant selection?

# Working Trees



Using multiple species in an agroforestry planting can make it more resilient to climate variability. Photo by Agriculture and Agri-Food Canada.

Changing annual crops in response to climate change is relatively straightforward. However, because trees, shrubs, and other perennial crops can take years to become productive, the choice of perennial plant will impact the operation for many years. Plant selection involves deciding which crops to grow or manage, including variety, seed lot, or other plant genetic characteristics. As farmers and forest managers face extreme weather events and climate variability, they should consider plants that are likely to be resilient now and in the future. Land managers can also use agroforestry to adapt to these challenges.



To create resilient agroforestry systems in the face of climate variability, plant selection should favor species and genotypes adaptable to projected environmental changes over the productive lifespan of the plant. For example, species or varieties that can withstand drought, late frosts, or other types of disturbances may be needed. Scientists have made predictions about regional weather changes, some of which have been observed already and others that are expected by mid-century. Changes in chilling days for fruit crops and growing season length may be particularly important.

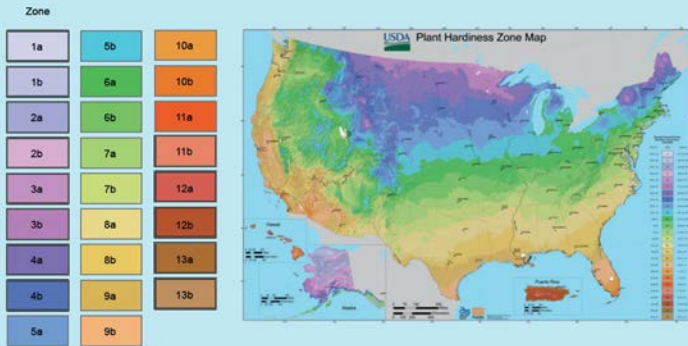
Crop diversity may also be beneficial; while one tree crop may suffer from a late frost, another may have a different bloom time that allows it to produce that year. This diversity can come from either growing multiple varieties or cultivars of the same tree crop or from multiple types of tree crops—or other crops—within the same system.

If planting from seed, it may be beneficial to consider using different seed lots. Seed lots are particular batches of seeds, often collected from a specific provenance or zone. Seeds collected this way may exhibit different characteristics than those from other seed lots, in terms of their ability to withstand different environmental stressors. By planting seeds from different seed lots, it is more likely that some plants will have the characteristics to survive heat, cold, too little or too much moisture, or other types of climate variability.

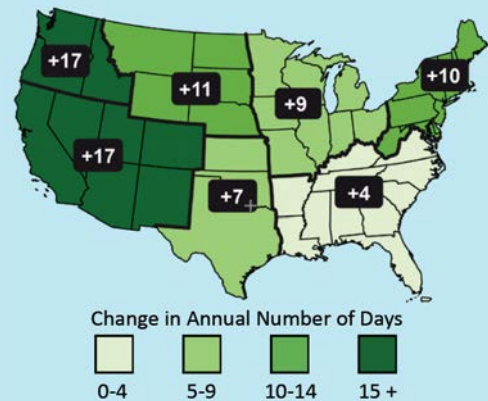
If possible, crops that might be particularly vulnerable to a climate risk should be planted in a protected location on the landscape. This can be done through examining the site's topography, avoiding frost pockets or exposed ridges, or by modifying the landscape through protective agroforestry practices like windbreaks. By selecting plants carefully, agroforestry practices can be made more resilient to current and future climate risks. This resilience can also be enhanced through careful planning and design.

## Observed and Projected Changes

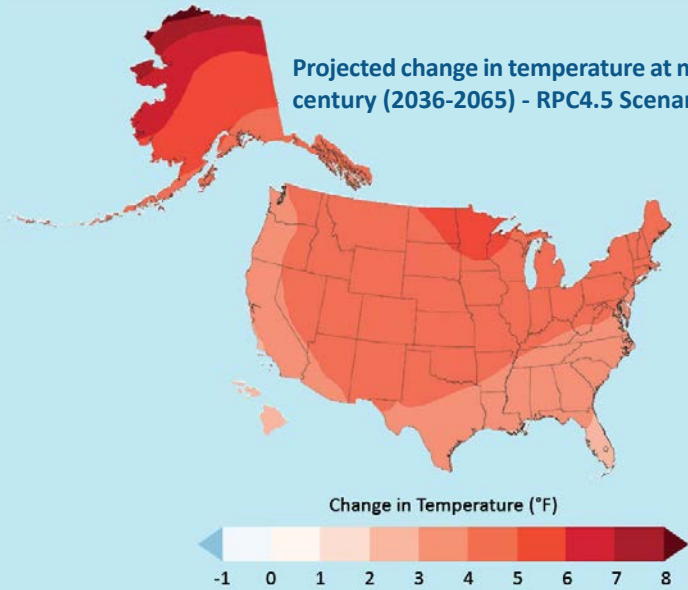
**USDA Plant Hardiness Zone Map, updated to reflect temperatures from 1976-2005<sup>1</sup>**



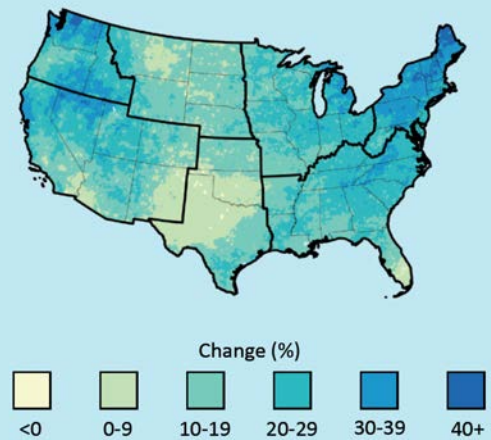
**Observed change in frost-free season, comparing 1986-2015 with 1901-1960<sup>2</sup>**



**Projected change in temperature at mid-century (2036-2065) - RPC4.5 Scenario<sup>2</sup>**



**Projected change in total annual precipitation falling in heaviest 1% of events by 2070-2099 compared with 1986-2015 - RPC4.5 Scenario<sup>3</sup>**



<sup>1</sup>USDA Plant Hardiness Zone Map, 2012. Agricultural Research Service, U.S. Department of Agriculture. [v://planthardiness.ars.usda.gov/](http://planthardiness.ars.usda.gov/)

<sup>2</sup>USGCRP, 2018: Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II doi: 10.7930/NCA4.2018. Figures 2.4 and 2.6

<sup>3</sup>USGCRP, 2017: Climate Science Special Report: Fourth National Climate Assessment, Volume I doi: 10.7930/JOJ964J6. Figure 10.3

For more information on climate change, visit: [www.fs.usda.gov/nac/topics/climate-change.php](http://www.fs.usda.gov/nac/topics/climate-change.php)



Contact: USDA National Agroforestry Center, 402.437.5178 ext. 4011, 1945 N. 38th St., Lincoln, Nebraska 68583-0822. <https://www.fs.usda.gov/nac/>

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