Spotlight on Climate

(700 words)

Species are Dying in Their Native Habitats – Replanting For the Future

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Climate change is here and now; you can see and feel it all around you. Each year we see higher temperatures that break the extreme records of previous years. We are now in a 20-year megadrought that is the 2nd worst in 1200 years. You may have already seen the huge patches of junipers that died north of the Peaks this past spring and summer. Wildfires increase with dead and dying trees. We've all been breathing the smoky air from fires burning throughout the west. The outlook is ominous, and studies project that these patterns will continue to get worse for the foreseeable future.

As we get hotter and dryer, plants throughout the Southwest are fleeing up mountainsides where it is cooler and wetter. Plants can't pick up and run, but their seeds can blow in the wind or be carried by animals. Grown plants that are already rooted simply die when it gets too hot and dry. A recent study of alligator juniper on the mountains outside Tucson showed that over a 50-year period they had died out in the lowest 1000 feet of their range. When such long-lived trees die over such a short time span, biologists become especially concerned.

Many plants are closely adapted to their local environment. For example, Fremont cottonwoods at high elevations leaf out later in the spring than Fremont cottonwoods growing at lower elevations where the growing season is longer and frost damage is less. Our studies of Fremont cottonwood show that these differences are genetic because when we plant the high elevation varieties at lower elevation they still leaf out later. In fact, each variety of Fremont cottonwood leafs out on a date matched to the growing conditions in the habitat it came from no matter where we plant it in our array of experimental gardens spread from Canada to southern Arizona.

In our studies we have found that such local adaptations can be very fine scale and differ over just a few hundred feet in elevation. This means that each local variety has the right genes that match it to its local environment in terms of growing season, moisture, temperature, and other competing species.

Now, as climate change is stressing and killing plants in their native habitats, is there anything we can do to help? Can we renew the productivity of rangelands, riparian vegetation, and other natural habitats that are declining due to climate change? Our studies with Fremont cottonwood in our experimental gardens have allowed us to measure the temperature tolerances of each variety from many locations. The resulting data allow us to advise restoration projects on which variety to plant if they want it to grow well under current climate or conditions 10, 25, or 50 years from now. If land managers or local growers plant the right mix of varieties with the right temperature tolerances and other adaptations, then they can count on healthy plants and healthy habitats for years to come.

The studies in our experimental garden array and by other research groups have now extended to include other species including other cottonwood, willow, pinyon, bunch grass, and desert shrubs. Our data on the many varieties of these species will provide better understanding of what to plant to match the new conditions of a changing world.

If we continue with emissions as usual and climate change continues as projected, we will have to modify what we plant in our yards, crops, and forests. The USDA publishes a Plant Hardiness Zone Map, which shows that over the past 25 years, most of the U.S. has changed by one hardiness zone reflecting how warmer environments have shifted northward and upwards in elevation. Our Southwest Experimental Garden Array (SEGA) funded by the National Science Foundation and NAU has allowed us to identify the varieties that can best survive future environments. This is a cost-effective method to help mitigate climate change impacts and adapt for the future.

Our Congressional Representative Tom O'Halleran is leading the charge to use this scientific approach to mitigate climate change and has introduced a bill into Congress to fund such efforts throughout the American West. To support this effort, please sign the petition at Change.org https://tinyurl.com/vmerjxrt.

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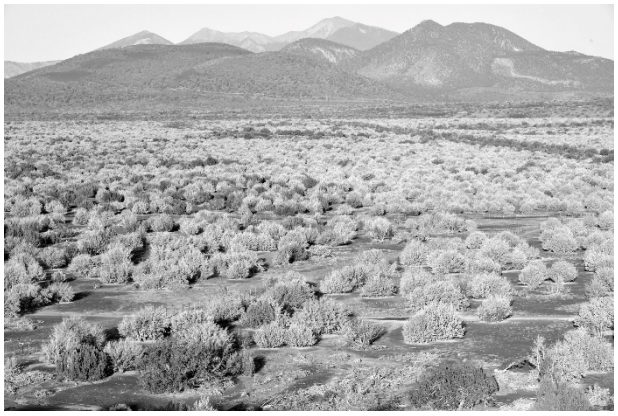
Northern Arizona Climate Change Alliance, www.NAZCCA.org/volunteer

Larger logo:



"Juniper die-off 030"
Juniper trees north of the San Francisco Peaks died this past spring and summer. These long-lived trees can no longer survive the megadrought that has been brought on by climate change across the Western states. photo by Michael Collier

“Juniper die-off 050”
We think of Juniper trees being 'tough as nails', but even Junipers are now dying from the new temperature extremes brought on by climate change. photo by Michael Collier

“Juniper die-off 022”
Massive die-off of Junipers north of the peaks happened this past spring and summer. These native trees can't keep up with rapid climate change to hotter and dryer conditions. photo by Michael Collier