



Make Your Garden More Climate-Resilient: Ecosystem

Earth is undergoing a warming trend that results in melting glaciers, rising sea level, increasing ocean acidity, and more frequent and severe droughts and floods. The Pacific Northwest has seen prolonged drought, increasing wildfire incidence and severity, heat waves, insect outbreaks, and tree diseases. Reduced snowpack results in earlier peak flows in rivers and streams and reduces water supplies. In addition to these trends, climate change brings erratic, extreme weather events (heat wave, heavy rain) in greater frequency. <https://blogs.oregonstate.edu/occri/oregon-climate-assessments/>

How do we garden in these times? This handout offers ideas for building resiliency into the garden.

What We Know

- There are an estimated 5 million species on earth, only 1.5 million have been identified.
- Climate change has and continues to cause species extinction and habitat destruction.
- Warming has changed phenology (seasonal natural phenomenon, such as when plants begin to grow or bloom) and affects different species at different rates. This leads to species relying on each other becoming out of sync.
- Many species respond to the warming trend by migrating north or to higher altitude, and by coming out of dormancy/hibernation earlier. This mass migration increases the chance of new invasive species.
- Biodiversity can be measured by the variety of habitats (ecosystem diversity), the number and variety of species (species diversity), and the variety of genes (genetic diversity).
- Habitat provides space, food, water, and shelter for an animal or plant to live. Ecosystem refers to the habitat, organisms, and how they interact together. Examples of ecosystems are forest, grassland, desert, and wetland. The warming climate affects ecosystems and habitats.
- There are 12 Level I ecoregions (an area where ecosystems are generally similar) in the US. Visit <https://www.epa.gov/eco-research/ecoregions> to figure out your ecoregion.
- Keystone species have great influence on the ecosystem and affect many other species. Examples are beavers for river or wetland ecosystems, and Oregon white oak for oak savannah ecosystems.
- Humans rely on natural processes, carried out by other species, to purify water and air, to decompose waste, and to recycle nutrients that keep the ecosystem healthy. Loss of species affects these natural processes. We don't know how much loss our ecosystem can endure and still provide essential services.

Potential Climate Mitigation

- Plant keystone species to attract and support diverse garden life.
- Add redundancy in garden habitat in anticipation of some climate-caused failures.
- Make new habitats for small creatures whose needs can be sustained in a garden.
- Choose plants with care and stay informed about invasive species.
- Rewilding (giving the land back to nature with little or no human intervention) is often coupled with reintroduction of keystone species.

What to Do

- Add keystone species to your garden: They have significant impact on many other species. To review candidates for your ecoregion, go to <https://www.nwf.org/Garden-for-Wildlife/About/Native-Plants/keystone-plants-by-ecoregion> These lists are based on the work of Dr. Doug Tallamy and horticulturist Jarrod Fowler, and compiled by the National Wildlife Federation. Lists show plants at the genus level with a few examples of common species. To locate native species in your area, use a state-based resource such as Oregon Flora (<https://oregonflora.org/>), Calflora (<https://www.calflora.org/>), and Washington Flora Checklist (<https://burkeherbarium.org/waflora/checklist.php?Category=Endemic>).
- Add new habitat: Some creatures' home range may match your garden. Examples:
 - Ground-nesting bees, accounting for 70% of native bees, need small, undisturbed areas for nesting. Begin with a 2-ft by 2-ft mulch-free area (these bees are too weak to dig through mulch) that is close to flowering plants and receives sun to part sun. Leave the soil alone and don't irrigate.
 - Queen bumblebees overwinter underground in abandoned mouse nests or under leaf litter. Leave undisturbed areas under trees and shrubs to provide protection.
 - Pacific chorus frogs benefit from simple, seasonal ponds. This Extension article gives guidance and links to more resources. <https://extension.oregonstate.edu/news/how-build-simple-pond-native-frogs>
 - Beetle bank is a raised area planted with bunching and other grasses to provide habitat for beneficial insects and other critters. Some principles may be adapted for home gardens. http://oregonipm.ippc.orst.edu/Agroecology/NEW_BEETLE_BANK_1.pdf
 - Add a puddling station near butterfly host plants and nectar source to offer water and minerals for butterflies, a provision of great importance during hot and dry periods. <https://www.nwf.org/-/media/Documents/PDFs/Garden-for-Wildlife/Tip-Sheets/Water-Butterfly-Gardens>
- Plant diversity and redundancy for important functions in your garden ecosystem: For pollinator food, begin with at least 3 flowering plants for each of spring, summer and fall season, to provide a long-season of food source. Then, add more bloom varieties to allow for some failures caused by extreme heat or late spring and still have enough for bees.
- Don't grow invasive species: Invasive plants escape horticulture to colonize natural areas and displace natives. Don't confuse them with vigorous growers that self-sow happily or spread well by roots. Learn what's invasive in your area. Oregon's Invasive Species Council offers resources at <https://www.oregoninvasivespeciescouncil.org/infohub>
- Observe and record biodiversity: Learn about your garden ecosystem to build a knowledge base for coping and adaptation. Journaling is a traditional tool that notes phenology of significant plants, incidents of pests and diseases, major weather events, and general garden progress. Newer tools such as iNaturalist <https://www.inaturalist.org> (an online social network of people sharing biodiversity information to help each other learn about nature) document and identify garden residents and visitors.
- Rewilding is generally applied to large areas with a focus on restoring ecological functions. Some principles may be relevant to home gardens. <https://www.iucn.org/resources/issues-brief/benefits-and-risks-rewilding>

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