Chapter IV
Resilience Practices

Farmers are resilient; as a matter of course, farmers adjust their practices from year to year based on weather, soil conditions, and markets. Climate change impacts, however, are expected to increase pressures on agriculture in Snohomish County and may necessitate added resilience measures or changes in management altogether. Fortunately, there are a variety of tools and approaches that can be adopted to increase agricultural resilience.

Specific climate change impacts that are anticipated in Snohomish County include less rainfall in summer months and more (and higher intensity) rainfall in winter months, higher temperatures overall, decreased water availability, increased flooding, heightened pest pressures, and the potential for saltwater intrusion into groundwater and irrigation ditches. Additional information on anticipated climate change impacts is included in Chapter V. These impacts will put additional burden on Snohomish County farms, which are already under threat from development and other pressures.

By their nature, agricultural activities are highly susceptible to the effects of environmental and social changes. To stay productive and viable, agriculture requires the resilience to adapt to such changes. The Food and Agriculture Organization identifies three key components of agricultural resilience: reducing exposure to shocks (such as a pest outbreak or a flood), reducing sensitivity to shocks, and increasing the ability to adapt. Improving overall productivity, increasing product diversity, enhancing soil resiliency, and increasing land protections are some of the main strategies recommended to address these three components of agricultural resilience.

The practices and management approaches described in this chapter do many things to help build resilience to climate change as well as to changing markets. They promote healthy soils by increasing organic matter content and therefore the soils' ability to hold water during droughts. They build in diversification of products and revenue streams. They help protect livestock health and production. They create alternative sources of water for livestock and irrigation. And they help protect farms from pests, rising flood waters, and other changes we expect to see in the coming years.

As part of the Agriculture Resilience Plan, the Snohomish Conservation District has developed a series of factsheets on resilience practices that can be adopted by Snohomish County farmers. Resilience practices relate to cropping, livestock, soil, and water. When adopted successfully, the practices interact with each other and can most effectively derive benefits if applied in combination. The results of research on nine resilience practices are summarized in this chapter. Full factsheets on each resilience practice are available online at http://snohomishcd.org/ag-resilience/. The full factsheets go into detail about the effectiveness, implementation approach, and potential agricultural benefits of each practice or set of practices.

Viability

"Agricultural viability requires being open to new ideas."

Nichlos Pate, Raising Cane Ranch, Photovoice 2017

Managed grazing is a system that imitates the natural grazing patterns of large herbivores in savannah and prairie environments and eliminates overgrazing, a problem worldwide and in Snohomish County. Animals in a managed grazing system can create landscapes that are highly productive while protecting water quality, sequestering carbon, and creating and maintaining carbon-rich soils. A managed grazing system focuses on two key components: how long livestock graze a specific area and how long the land is able to rest before livestock return. Benefits of managed grazing include increased production of forage, increased soil fertility, reduced soil compaction, increased resistance to drought, better control of forage species, cost savings, and carbon sequestration.

Silvopasture is the practice of incorporating trees into a livestock grazing system with the goal of integrating the management of tree crops, livestock, and forage. Trees are typically selected for their crop value and can include fruit, timber, or nut trees. Trees grow faster and wider in girth in a silvopasture system due to the fertilizer provided by animal manure. Forage stays productive longer into the season and has a better nutritional profile. Livestock show less overall stress, put on weight more easily, and produce more milk than livestock grazed in open pasture alone. Silvopasture offers a multifunctional land use in which production and protection can be achieved on the same parcel of land at the same time.

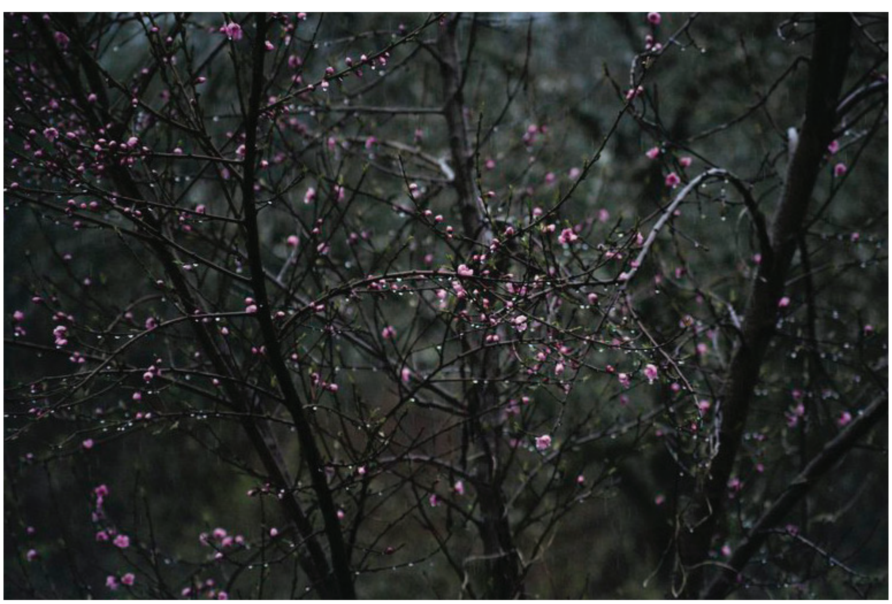
Agroforestry is a land management system that combines the production of perennial and annual crops with trees. Agroforestry maximizes economic production by producing high value tree crops while maintaining regular income with annual companion crops. Agroforestry practices include alley cropping, forest farming, riparian buffers, silvopasture, and windbreaks. These practices can be used individually or can be combined to create landscape-wide diversity of production and ecological benefit. Benefits of agroforestry can include positive impacts on soil ecology and water holding capacity, decreases in weed competition, increases in farm economic resiliency, access to new and potentially lucrative markets, protection of genetic diversity in food crops, improvements to water quality, and decreases in erosion.

Biochar is a soil amendment with the potential to improve soil tilth, enhance fertility, and decrease fertilizer inputs and irrigation needs. Biochar, which is essentially charcoal, has traditionally been produced by piling wood, covering it with earth, and allowing it to burn in smoldering piles. This approach, however, releases a large amount of carbon into the atmosphere. A new, more efficient method has been developed; known as pyrolysis, this method involves heating organic materials in low oxygen conditions. When added to soil, biochar can increase soil health and water holding capacity, decrease fertilizer and irrigation needs, reduce soil acidity, absorb greenhouse gases, and enhance crop yields.

Conservation Agriculture is a farming system that improves soil resilience and agricultural productivity through a set of soil management practices designed to create an ongoing sustainable system. The three core principles of conservation agriculture are to minimize soil disturbance through no-till or conservation-till methods, to maintain soil cover throughout the year with cover crops, and to manage crop rotations to combat pests and pathogens. No-till or conservation-till methods protect soil structure, soil composition, and biodiversity. Soil cover methods such as cover crops provide organic matter to feed the soil, protect against soil erosion by holding soil in place, and increase soil biodiversity and nutrient availability to crops. Crop rotations protect against pest and disease problems by interrupting the life cycle of certain bacteria, fungi, insects, and weeds. Conservation agriculture produces a constant net increase of soil organic matter rather than a decrease. At the same time, it produces a consistent improvement in soil moisture retention, which can minimize the impact of drought.

Regenerative agriculture is a method of farming the land while at the same time regenerating or improving the natural functions of the farm ecosystem. Regenerative agriculture involves adoption of a number of resilience practices as part of a holistic system. These practices can include no-till and pasture cropping, application of compost and/or biochar, managed grazing, silvopasture, agroforestry, multi-species cover crops, and crop rotations. Regenerative agriculture creates a system that more closely mimics nature's ability to cycle nutrients and eventually reduces the need for costly external resources such as fertilizers and pesticides. This results in increased yields, increased resilience to droughts and floods, and diversification of products.

Integrated pest management is an ecosystem-based approach that aims to keep pest populations below the economic injury level while reducing the use of pesticides and minimizing risks to people and the environment. Specific techniques used in integrated pest management can involve cultural controls, biological controls, and/or mechanical controls. Cultural controls are practices that reduce the initial establishment, reproduction, and overall survival of a pest by creating a less hospitable environment. Biological controls use a pest's natural enemies (such as parasites, predators, or pathogens) to keep pest populations low. This can be accomplished by increasing habitat for desirable species or through timed release of specific predators or pathogens. Mechanical controls directly kill, block, or make the environment inhospitable to pests using physical components, such as temperature, humidity, or light. Examples of mechanical controls include tillage, flaming (burning an area), barriers (such as fine mesh), soil solarization, and plastic mulching for weeds.



Resilience

"Climate change in this region has brought early floods and late floods, drought and, most recently, the highest spring rainfall in recorded history. As farmers we take note of these and other changes in the natural world because it's part of our job. Our livelihoods are born of these natural processes (growing plants, raising livestock) and they are constantly in flux in small and large ways. It is humbling to work amidst the call and response of nature."

Libby Reed, Orange Star Farm, Photovoice 2017

Stormwater harvesting, also known as rainwater collection, is a method of storing rain that falls on roofs. Rainwater tends to have a neutral pH and is therefore gentle on crops and can be stored for agricultural irrigation and watering. Harvesting rainwater from existing roofs is legal in Washington State- and property owners can collect and store this water onsite without a permit. Storage containers include polyethylene tanks and PVC bladder tanks. Typical systems require gutter work, tank installation, and a pumping system. A 1,000-square-foot roof in Western Washington sheds over 22,000 gallons of water every year that could be stored and used for irrigation purposes.

Waterbreaks are linear systems of forested plantings planned and designed to reduce flooding impacts for lands adjacent to streams and rivers. Forested systems such as waterbreaks can help maintain some of the natural functions of a river system while reducing flood damages to agricultural lands. Waterbreaks can trap and hold debris from floodwaters thus keeping it off of agricultural fields. They also reduce scouring and sand deposition in fields, protect levee systems, reduce soil and bank erosion, and protect water quality. Waterbreaks should be planted parallel to a river or stream as well as along field borders. Plant species used in waterbreaks typically include native plants that can tolerate flood conditions and are adapted to the specific soils and site conditions.

1 Building Resilience for Adaptation to Climate Change in the Agricultural Sector: Proceedings of a Joint FAO/OECD Workshop. 23–24 April 2012. Edited by Alexandre Meybeck, Jussi Lankoski, Suzanne Redfern, Nadine Azzu and Vincent Gitz http://www.fao.org/docrep/017/i3084e/i3084e.pdf