Pollination

Pollination is the process by which pollen is moved within flowers or carried from flower to flower by pollinating animals such as birds, bees, bats, butterflies, moths, beetles, or other animals, or by the wind. Within the same species, this leads to fertilization and successful seed and fruit production for plants. Pollination ensures that a plant will produce full-bodied fruit and a full set of viable seeds. Pollinators are the animal species that facilitate the transfer of pollen. A diverse array of different plants rely on the assistance of pollinators for this process to occur and otherwise would be at risk of extinction. This includes more than 180,000 different plant species and over 1,200 crops, making pollinators an essential part of the health of plants, people, and the planet!

https://www.nps.gov/teachers/classrooms/pollinators-on-the-tallgrass-prairie.htm
https://www.fs.usda.gov/managing-land/wildflowers/pollinators/what-is-pollination
https://www.pollinator.org/pollinators
https://www.pollinator.org/pollination

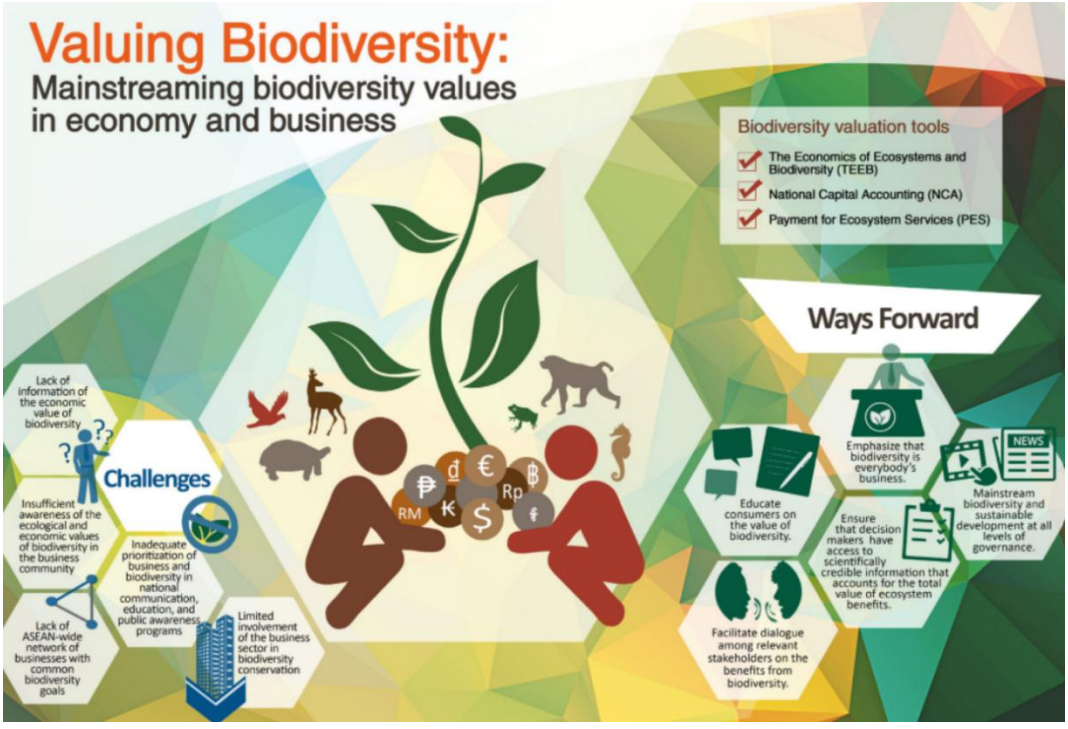
Nutrient Cycling

Nutrient cycling is an essential process in all ecosystems where organic and inorganic matter are used and recycled in the environment to produce life. Pollinators and their forage plants are each

involved in many nutrient cycles as they consume nutrients from the soil and release them back into the environment. Nutrients such as carbon, nitrogen, sulfur, phosphate, oxygen, and hydrogen are key building blocks that make up world. By filling a critical role in the lifecycles of plants, pollinators play a crucial part in the maintenance of nutrient cycles.
http://mdocs.skidmore.edu/crandallparktrees/ecosystem/nutrient-cycling/
https://www.sciencedirect.com/topics/earth-and-planetary-sciences/nutrient-cycling
https://blogs.ntu.edu.sg/hp331-2014-29/?page_id=14
https://serc.carleton.edu/integrate/teaching_materials/food_supply/student_materials/865
https://www.esf.edu/cue/documents/Bormann-Likens_Nutrient-Cycling_1967_000.pdf

Biodiversity

Biodiversity is the number of different species in a given environment or habitat. An area with high biodiversity will have a high number of different species filling different roles within the ecosystem. Pollinators of many different species help improve biodiversity by facilitating the reproduction of native and diverse plant species that, in turn, provide food and shelter for many birds, mammals, and insects. Biodiverse ecosystems are more resilient against sudden changes to the environment such as introduction of disease, natural disasters, changes in weather, and interference by humans. In fact, sustainable natural and agricultural ecosystems worldwide are only possible with sufficient biodiversity. In the United States alone, the economic and environmental benefits of biodiversity are estimated to be worth around $300 billion annually.
https://www.nationalgeographic.org/encyclopedia/biodiversity/
https://www.worldwildlife.org/pages/what-is-biodiversity
https://plato.stanford.edu/entries/biodiversity/
https://www.jstor.org/stable/1313097?seq=1



Erosion Control

Erosion is the gradual breakdown of land or other solids from forces including wind, rain, ocean waves, or ice. The roots of pollinated plants bind to soil and rock particles, helping hold the soil together during floods, windstorms, and even landslides to prevent erosion. One reason why deserts are such severely eroded landscapes is that they lack trees, shrubs, and other plant species to hold their soils in place. Coastal and cliffside habitations and roadways are at risk of severe damage if erosion leads to landslides and fallen debris.
https://www.nationalgeographic.org/encyclopedia/erosion/
https://www.britannica.com/science/erosion-geology

Resources for Wildlife

Pollinators and the plants that they allow to grow provide sustenance and other resources to the other members of the ecosystem. Honey from bees is an example of a key food source for a wide variety of organisms across a huge range of ecosystems. As primary producers, plants provide energy that all living animals must consume in order to survive. If native plants suffer from a lack of pollinators and are outcompeted and replaced by invasive species, other trophic levels will also be affected.
https://www.fs.usda.gov/wildfl...
https://heroforttheplanet.org/pollinators/explore/food-web/
https://www.biorxiv.org/content/10.1101/791707v1.full
https://conbio.onlinelibrary.wiley.com/doi/abs/10.1111/j.1523-1739.2008.01129.x

Food Security

Pollinators help produce 1 of every 3 bites of food we consume. Nearly $217 billion in agricultural productivity are contributed by pollination services and between $1.2 and $5.4 billion are from honey bees alone. Farming for and producing vegetables at home is a cheap and sustainable method of finding sustenance for individuals who may not otherwise have access to a complete and healthy diet. Food security is assurance that an individual has a sufficient supply of food and sustenance rather than uncertainty regarding their next meal. A simple bowl with tomatoes, broccoli, beans and cucumbers would not be possible without the existence of pollinators! Without pollinators, the amount of food our agricultural system can produce would be greatly diminished.
https://www.pollinator.org/pollinators
https://www.pollinator.org/bff
https://www.usda.gov/topics/food-and-nutrition/food-security
https://www.ecpa.eu/sites/default/files/Pollinators%20brochure_B%C3%A0T2.pdf

Carbon Sequestration

Carbon sequestration is the removal of carbon from the atmosphere through capture or storage of the gas in mediums such as plant materials and soils. Photosynthesis, the process by which plants synthesize their food, uses atmospheric carbon dioxide and gives off oxygen in its place, storing atmospheric carbon as biomass. The plants that rely on pollinators are absolutely critical to maintaining the balance of our atmosphere that allows us to survive and thrive. By helping more

trees and other plants establish, pollinators help mitigate climate change and positively affect the wellbeing of the planet.
https://www.fs.usda.gov/features/power-one-tree-%E2%80%93-very-air-we-breathe
https://ssec.si.edu/stemvisions-blog/what-photosynthesis
https://royalsocietypublishing.org/doi/full/10.1098/rstb.2007.2185
https://www.usgs.gov/faqs/what-s-difference-between-geologic-and-biologic-carbon-sequestration?qtnews_science_products=0#qt-news_science_products

Recreation

Nature photography, including floral or botanical photography, increases appreciation for the beauty of nature and inspiring action to preserve, conserve, and protect natural resources.
Birding, the practice of observing or enjoying birds in their natural habitats, offers more than just an opportunity to connect with nature, it also provides significant mental and cognitive health benefits. Birding is accessible to everyone, ensuring that people of all abilities can experience these benefits firsthand.
Nature journaling—sketching and annotating observations about natural phenomena—also builds crucial cognitive and processing skills like close observation, technical illustration, attention to detail, critical thinking, and the ability to organize and categorize information.
The benefits of hiking - Hiking is a great way to get out in nature and get some exercise in. There are many hiking benefits. Lesser known is that it reduces anxiety and depression - Clear blue skies, flowers in bloom, squirrels frolicking among the trees — being in nature is such a great way to get a natural boost of happiness.
https://www.npsot.org/posts/more-than-pretty-pictures-the-functions-of-botanical-photography/
https://www.birdability.org/mentalhealthbenefits
https://www.sacramentoaudubon.org/
https://www.edutopia.org/article/benefits-nature-journaling
https://health.clevelandclinic.org/9-benefits-of-hiking

Soil Health

Soil health and stability is especially important because its fertility helps determines the protein health of plants, which helps plats fight against pests and disease. Generations of plants supported by pollinators die and decay, providing the necessary nutrients for the next generation of life. Some plants, like legumes, fix nitrogen and other nutrients from the air, making them accessible in the soil for other organisms. Healthy soil also has balanced populations of microorganisms and larger organisms like earthworms that are critical for the decomposition and breakdown of dead matter, as well as providing other key functions such as detoxification of soil and suppressing dangerous microorganisms that would be harmful to plants, animals, and humans. A decline in the pollinators would lead to less nutrient cycling and less fertile soil. A lack of fertile soil and plant life would render large regions of land essentially unlivable.
https://www.sciencedirect.com/science/article/abs/pii/S0929139300000676
https://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/
https://rodaleinstitute.org/why-organic/organic-farming-practices/soil-health/
https://www.smithsonianmag.com/science-nature/soil-has-microbiome-too-180960088/

Water Filtration

Water is perhaps the most significant natural resource that is critical for life. Water filtration is the removal of harmful solutes and microorganisms from water supplies in nature. This process is often performed by artificially constructed facilities in order to provide our cities and towns with safe and potable water, but many of the plants that rely on pollinators also play a key role in removing contaminants like heavy metals, inorganic and organic solids, as well as a wide variety of bacteria from water. This process helps cleanse the water and make it safe for the fish and microorganisms that live in the water as well as the terrestrial animals and humans that drink the water. If pollinators continue to decline and the plants that rely on them for reproduction begin to disappear, then the biodiverse organisms that have evolved alongside them and grown to rely on their ability to cleanse the water would suffer the consequences.
https://www.sciencedirect.com/science/article/pii/B9780124050709500244
https://sciencing.com/do-wetlands-purify-water-7585568.html
https://www.jstor.org/stable/4065012?seq=1
https://berkeleysciencereview.com/article/natures-water-filter/

Pesticides not needed

Native plant gardening typically avoids pesticides because native plants have evolved alongside local pests and often possess natural defenses against them. This reduces the need for chemical interventions, promoting a healthier ecosystem for beneficial insects and wildlife.
California native plants do not require pesticides because they are adapted to thrive in local soil and climate conditions, having co-evolved with local insects and wildlife. This natural adaptation allows them to resist pests without the need for chemical interventions, promoting a healthier ecosystem.
https://gardenforwildlife.com/blogs/learning-center/guardians-of-your-garden-how-native-plants-help-control-pests-and-diseases-while-nurturing-wildlife?srsltid=AfmBOoo-vEWwdEmVegcRHLDyjYERfxeOmKW654VSRfN9NFYb2MuX3j_a
https://www.lawaterkeeper.org/news-stories/california-native-plants

Connecting with nature

Nature-deficit disorder is a term coined by journalist and author Richard Louv to describe the growing gap between people — especially children — and the natural environment. While it is not a formally recognized medical condition, the concept highlights a very real phenomenon: as we spend more time indoors, absorbed by digital devices and urban routines, we lose touch with the restorative benefits of the great outdoors. This disconnection can have negative implications for our physical, mental, and emotional health.
https://www.wildcenter.org/understanding-nature-deficit-disorder/

Traditional resources

The sacred wisdom and traditions, of indigenous people, were gained over a millennium of generational experiences. Native plants are not only essential to wildlife, but they provide humans food for nourishment, herbal medicinal remedies, and crafting materials for baskets, strings and more! The traditional resources zone highlights, not only pollinating plants and host plants for little

critters and birds, but the potential for a deeper bond between humans and our environment in our own yards and community gardens. The benefits don't end with adults either, this interactive garden design is supportive of multiple development domains for children --- intellectual, emotional, social, spiritual, physical, and much more. In nature there is no waste, therefore, in this zone, another important feature includes recycling and using every part of the plant, while protecting the landscape's overall health. As we tend to the earth, it tends to us!
https://www.sacvalleycnps.org/wp-content/uploads/2025/09/Traditional-Resources.pdf

ADDITIONAL ECO-SERVICES

Resilient Ecosystems (no icon)

Ecosystem resilience is the trend for ecosystems to reach equilibrium. If the system is disturbed, a new equilibrium is reached based on the new conditions. The biodiversity supported by pollinators helps create negative feedback loops that keep ecosystems in a state of equilibrium, making it critical to protect pollinators and the plants that they rely on. As biodiversity is slowly lost in an ecosystem, it becomes easier for a disturbance to force the system into a new equilibrium, often making it unable to provide the same ecosystem services it once did.
https://www.nap.edu/read/18387/chapter/5#50
https://www.nap.edu/read/18387/chapter/5
https://www.e-education.psu.edu/geog30/node/398
https://www.sciencedirect.com/topics/earth-and-planetary-sciences/ecosystem-resilience

THE PLANTS & WILDLIFE depicted

Toyon (Christmas Berry) *Heteromeles arbutifolia*

Evergreen Shrub: Great screen or specimen plant. Great hedge plant, often mixed with Coyote Brush (pictured here), Coffeeberry, Manzanita and Ceanothus. Also called 'Christmas Berry'.
Size: **Width**: 8-15 ft. **Height**: 15-25 ft.
Flower: Spring blossoms are a favorite of pollinators. Red berries in **December and January** attract many birds.
Water Needs: Very drought tolerant.
Sun Needs: Toyon likes full sun, tolerates full shade.
Local Ecology: **Native** to California and occurs on the American River Parkway including at Upper Sunrise, River Bend, and William Pond.
Wildlife Supported: Bees are attracted to the flowers. Birds love the berries. Butterflies & moths hosted: 4 confirmed, 4 likely
https://calscape.org/Heteromeles-arbutifolia-(Toyon)

Cedar Waxwing *Bombycilla cedrorum*

Cedar Waxwings are delightful birds and fairly common here in the Sacramento Valley. Most of the time, they fly in flocks and often show up in our yards. Cedar Waxwings are very social birds. There have been

several reports of waxwings seen passing berries, one-by-one, down a row of birds!
https://www.sacramentoaudubon.org/kids-corner/meet-the-cedar-waxwing
https://www.audubon.org/field-guide/bird/cedar-waxwing

Narrow Leaf Milkweed *Asclepias fascicularis*

Deciduous Perennial: This California native plant is drought tolerant. Milkweeds are **Host Plants** for the Monarch butterfly. Milkweeds die back completely by fall and don't leaf out until May.
Height: 2'- 3' stems.
Flower: Flower cluster bloom most of the summer.
Water Needs: It likes a little bit of water.
Sun Needs: Milkweeds need sun (fewer flowers in shade).
Ecology: **Native** to California and is also found outside of California, but is confined to western North America.
Wildlife Supported: Butterflies, primarily Monarchs. Butterflies & moths hosted: 2 confirmed , 4 likely
https://calscape.org/Asclepias-fascicularis-(Narrow-Leaf-Milkweed)?srchcr=sc5d9b587a04592

Monarch Butterfly *Danaus plexippus*

The iconic black and orange monarch butterfly is known for its astonishing long-distance annual migration and reliance on milkweed (*Asclepias* spp.) as its obligate larval host plant. Though genetically similar, there are two subpopulations of monarchs in North America, with the eastern population overwintering in Mexico and breeding in the midwestern states, and the western population overwintering in coastal California and fanning out across the west from Arizona to Idaho to breed.
https://wildlife.ca.gov/Conservation/Invertebrates/Monarch-Butterfly

Blue Elderberry Sambucus mexicana

Large shrub or tree, deciduous: Fast growing, host to endangered beetle. Many bird species love this plant. Elderberries are one of the most important source of food for birds in California. Berries are tart, distinctive, and versatile. From Syrup and Jam to Wine.
Height: 15-30' tall and wide.
Flower: Huge clusters of white blossoms in the spring.
Water Needs: Moderate water.

Requirements: Sun/part shade
Ecology: It is **native** to California and is also found elsewhere in North America and beyond.
Wildlife Supported: Host to the Valley Elderberry Longhorn Beetle. Many bird species. Elderberries are one of the most important source of food for birds in California.
Butterflies & moths hosted: 23 likely

Black Phoebe *Sayornis nigricans*

The Black Phoebe is a dapper flycatcher of the western U.S. with a sooty black body and crisp white belly. They sit in the open on low perches to scan for insects, often keeping up a running series of shrill chirps. Black Phoebes use mud to build cup-shaped nests against walls, overhangs, culverts, and bridges. Look for them near any water source from small streams, to suburbs, all the way to the salt-sprayed rocks and cliffs of the Pacific Ocean.
https://merlin.allaboutbirds.org/
https://www.audubon.org/field-guide/bird/black-phoebe

California Fuchsia *Epilobium canum*

Deciduous, perennial shrub: If you are into hummingbird gardening, you must have this plant. You can cut to ground after flowering in the fall but starts to regrow almost immediately. Spreads nicely if watered.
Height: 1-1 ½'
Flower: Tubular red-orange flowers in summer-fall.
Water Needs: some, water deeply 1-2 times per month.
Requirements: Full sun/part shade
Ecology: Dry slopes and ridges, Central valley, desert mountains
Wildlife Supported: Hummingbirds. Butterflies & moths hosted: 15 likely
https://calscape.org/Epilobium-canum-(California-Fuchsia)

Anna's Hummingbird *Calypte anna*

Tiny among birds, Anna's are medium-sized and stocky for a hummingbird. They have a straight, shortish bill and a fairly broad tail. When perched, the tail extends beyond the wingtips.
https://www.audubon.org/field-guide/bird/annas-hummingbird
https://en.wikipedia.org/wiki/Anna%27s_hummingbird

Common Yarrow *Achillea millefolium*

Evergreen Perennial: Strongly scented leaves, attracts butterflies and beneficial insects. Great in dried flower arrangements. Attracts: Birds, bees and butterflies (is a known host plant for the Painted Lady butterfly)

Height: 1-3'
Flower: Spring-fall blooming, small, white flowers in flat-topped, round cluster with beautiful fern-like leaves.
Water Needs: Once established, water deeply every 1-2 weeks. Ample water encourages spread.
Sun Needs: Part shade but can take more sun if watered.
Ecology: Grows in distributed in many habitats below 1200 feet.
Wildlife Supported: carnivorous insects; butterflies; bees and Host to 5 moth larva

Ladybugs *Novius* - 11 ladybug species live in California.

Ladybugs are small, beautiful creatures that feature vibrant red or yellow colors. The main reason that ladybugs are so well-loved by backyard gardeners and farmers is because of their voracious appetite for pests! *Ladybugs are known to eat a wide variety of problem bugs, such as aphids, chinch bugs, asparagus beetle larvae, alfalfa weevils, bean thrips, grape rootworm, Colorado potato beetles larvae, spider mites, whiteflies, and mealybugs.*
https://birdwatchinghq.com/ladybugs-in-california/
https://animalofthings.com/types-of-ladybugs-in-california/

California Poppy *Eschscholzia californica*

Annual to Perennial: An annual or perennial plant that is beneficial to native bees, honey bees, and butterflies! The flowers are bright and beautiful. Prolific reseeder. Easy to control.

Height: 2'
Flower: Bright orange. Blooms April – July (if it gets some supplemental water.
Water Needs: None – it will die back early.
Sun Needs: Full sun/part shade.
Ecology: Native to California and elsewhere, but not outside western North America.
Wildlife Supported: Birds, small herbivores, butterflies, bees, other pollinators. Butterflies & moths hosted: 5 confirmed, 2 likely
https://calscape.org/Eschscholzia-californica-(California-Poppy)?srchcr=sc5d9a659b632e8

Bumble bee *Bombas*

Bumble bees are important pollinators of wild flowering plants and agricultural crops. They are able to fly in cooler temperatures and lower light levels than many other bees, making them excellent pollinators—especially at higher elevations and latitudes. They also perform a behavior

called “buzz pollination,” in which the bee grabs the flower in her jaws and vibrates her wing muscles to dislodge pollen from the flower. Many plants, including a number of wildflowers and crops like tomatoes, peppers, and cranberries, benefit from buzz pollination.
https://xerces.org/bumble-bees
https://www.bumblebeeatlas.org/pages/california

Coyote Mint *Monardella villosa*

Perennial shrub: Small green leaves with soft hairs. It is stress deciduous. Leaves have a minty fragrance. Butterflies love this plant! It was used by Native American groups as a remedy for stomach upset, respiratory conditions, and sore throat. It may also be steeped into a mint tea. Can re-bloom if deadheaded.

Height: 12-24”
Flower: Purple – blue “puff balls” of tiny flowers in summer.
Water Needs: 1-2 times a month; prefers well drained soil
Sun Needs: Part shade to sun.
Local Ecology: Several Plant Communities including Oak Woodland.
Wildlife Supported: Primarily butterflies for nectar. Butterflies & moths hosted: 7 confirmed, 2 likely
https://calscape.org/Monardella-villosa-(Coyote-Mint)

Pipevine Swallowtail Butterfly *Battus philenor hirsuta*

The central and northern California population is isolated from populations in the rest of its range and as such is considered the *B. philenor hirsute* is considered separate subspecies. The signature riparian butterfly of our region, occurring along streams in foothill canyons and on the Central Valley floor, essentially everywhere where **its only host plant,** California Pipevine or Dutchman's Pipe, *Aristolochia californica*, occurs. It is unmistakable and very conspicuous as both a larva and an adult.
https://butterfly.ucdavis.edu/butterfly/battus/philenor
https://www.nps.gov/articles/california-pipevine-swallowtail.htm

Dutchmans Pipevine *Aristolochia californica*

Deciduous Vine: This California native vine has become fairly drought tolerant with time. Is the **Host Plant*** for the Pipevine Swallowtail. Vine can cover a trellis. It is SLOW to start growing, then once its roots are happy will shoot up!
Height: Easily climbs 10-30'.
Flower: In Spring the bare vine is covered with fascinating 'pipe' flowers. Then it leafs out.
Water Needs: Very little once established.
Sun Needs: The base of the plant prefers part shade but the vine will seek sun or filtered sun (i.e.. under an oak).
Ecology: **Native** to California and is endemic (limited) to California alone.
* A ***butterfly*** will lay her eggs on it's ***host plant***. The caterpillar will only eat this plant's leaves.