



Forests and Climate Change: Fire Web of Life

Activity Summary:

Ecosystems are held together by the interactions and connections among their components. This activity enables your group to see the vital connections among plant and animals in a forest after a wildfire, then explore the ways that human activities, and now human-caused climate change, are influencing this web of forest connections. Individuals will stand in a circle and pass a string building a web, representing the ways species depend on each other and fire as a vital rejuvenating force in the ecosystem. Once the web is built, the group is introduced to several human impacts, including climate change, that are placing strain on the ecosystem. The group discussion can be tailored in a variety of ways to facilitate a rich conversation that feeds off of the group's knowledge and interests. This activity also acts as a lead-in to the **Post-Fire Salvage Logging Citizens Panel**.

"We must understand that a forest is not a bunch of trees. 'Forest' is the name of the process of weaving lives in an endless tapestry, creating a complex whole where each part is astonishing and alive and worthy."

- Kathleen Dean Moore

Objectives:

By the end of this activity, your group will be able to:

- Become familiar with common species of the fire-adapted dry forests (ponderosa pine and mixed-conifer forests) on the eastern slopes of the Cascades.
- Describe the importance of wildfires to fire-adapted forest ecosystems through example species and their interactions in a burned landscape.
- Recognize the destabilizing impacts of historic human impacts on the landscape, as well as the emerging impacts of climate change and how these impacts ripple throughout the web of life.

Methods:

Identifying Relationships and Patterns, Analyzing Cause and Effect

Materials:

Printed copies of [plant and animal cards](#) and ball of yarn, string, or twine

Audience:

Any age or ability, small group up to 15 people. If necessary, divide your group into smaller circles or pair up two people per card.

Time Considerations:

30 minutes

**Set Up:**

Choose the cards you will use in the activity based on the number of participants, your location, and the group's familiarity with the ecosystem. (If you would like to add a guessing game lead-in, see the "**Modifications**" section below for additional preparation instructions.)

Background:

- This video is a simple introduction to the role of wildfires in forest ecosystems of the western US:
<https://bit.ly/35c3F4W>
- This TED Talk describes the changing wildfire regime in the Northwest with a focus on dry ponderosa pine and mixed-conifer forests, which is also the focus forest types for this activity:
<https://bit.ly/3aKCgIF>
- GLOW Call: Deep Dive into Fire Ecology with Susan Prichard:
<https://bit.ly/2W66znQ>
- The Northwest Climate Adaptation Center has put together an extensive webpage detailing climate impacts, wildfires, and forests in the Northwest:
<https://bit.ly/2zF94pD>
- An opinion piece about dry forest management, wildfires, carbon storage, and climate change:
<https://bit.ly/35ezt9m>
- Wildfire, huckleberries, and the Tulalip Tribe:
<https://bit.ly/2W9EV9g>



Facilitating the Activity

1. Bring your group together in a circle (sitting or standing) so that everyone can see one another (if your group is new, consider a quick name and icebreaker introduction).
2. Ask the group, *“have you ever been struck by the beauty of a spider web? With its strands reaching out, connecting to tree trunks, or rocks, or a fence post?”* They’re a mesmerising feat of engineering. Spider webs manage to somehow keep the tension in perfect balance. Now picture a forest (or look around, if you’re in one) and think of all the kinds of living and nonliving things that are connected here. Some connections are obvious, like a squirrel depending upon a tree’s pine cones. Others are mysterious and still poorly understood by scientists, like fungi providing essential nutrients and even networks of communication among trees. If we could take a pencil and draw the connections in the forest, the picture might start to look something like a crazy spider web. But what about fire? How does fire fit into a web? Ask your group for ideas.
 - **Support Questions:** Do you think fire would harm these connections, thereby destroying the web? Would fire rebuild connections or add new strength to the web?
 - **Facilitation note:** These initial questions allow you to gauge your group’s familiarity with the topics of forest ecosystems and wildfire. Your group may have a depth of knowledge that you can build off of throughout the activity or these answers may allow you to gauge what fundamental terms or concepts you will need to establish for your group.
3. Explain to the group that you will be working as a group to bring this web to life. As you pass out cards to each person, ask your group about what disturbances besides wildfire might impact this web (fragmentation, climate change, livestock, invasive species, fire suppression, etc) this will also allow you to gauge your groups knowledge. Leave this as a cliffhanger, explaining that after we have built this web, we will explore some of these other disturbances and add deeper meaning to our web.
4. Next bring out your ball of string and explain that the string will lead us through some of the connections, impacts and changes that happen in our forests after a fire. Explain that every living being in these forests plays a role in a fire-adapted forest, whether through their physical appearance, behaviors, or both.
5. Ask everyone to look around the circle and consider the ways that their plant or animal is connected to others in the circle. Encourage people to get creative! Think habitat, competition, food, shelter, predators, etc. Ask that each person, when they receive the yarn, to do two things:
 - Share a connection that their species has to fire (many can be positive although some may be harmful).
 - Explain a connection to another species in the circle as they pass their yarn. Encourage your group to reference the information on the back of their card if they are unfamiliar with their species, or drawn on their own knowledge to make a deeper link.



6. Start by holding the ball yourself, explain to the group that you'll represent the sun bringing energy into the system. Pass the ball off to anyone in the circle who is a plant because photosynthesis is the main way that energy enters an ecosystem, so our web will start with a plant. Then allow your group to take over passing the yarn and building the web. Each person will pass the ball of string to another person in the circle, building more and more connections until everyone has been linked. Some people may be linked multiple times. Encourage your group to be creative with the connections and offer their knowledge about these connections if they are familiar with these ecosystems. If your group needs more framing, ask them what every living thing needs to survive (water, food, shelter, and a suitable climate, for instance). Some groups may gravitate towards an individualistic one-at-a-time approach while others may work as a group to build meaning and share contributions more fluidly - as the facilitator, you have the ability to guide this process.
7. To really drill home the point that everything in this web is connected, send a pulse through the web. To do this, first check that your group is holding the string taut. Tell the one person with a tree card that they have been struck by lightning and is now the source of a wildfire that is spreading through the ecosystem. Ask this person to tug gently on their part of the string like a pulse, and tell the rest of your group that when they feel a tug, they should tug gently too. Have your group watch the tug move throughout the web - the whole web will end up shaking! When a wildfire passes through an ecosystem, we witness a cycle of rejuvenation, regrowth, and adaptations coming to life. We are also reminded of the ways that everything is connected even after a forest fire. Wildfires send a pulse of life through forests, returning nutrients to the soil, opening up space for new growth, and allowing a surge of biodiversity among insects, birds, and mammals. These fire adapted forests actually *need* fire to maintain biodiversity.

Discussion connections (where you choose to steer the discussion stage of the activity can vary in response to your groups' interests and questions, or you may use this conversation as a transition to your next activity):

- **What are we missing?** Acknowledge that our web is a vast simplification - What isn't included? (there are countless species that your group may offer - insects being the largest proportion of living beings in the forest that we have boiled down to one species) What about the connections that are too small for the human eye to see? In a gram of forest soil live between ten million and one trillion bacterial cells and dozens or hundreds of meters of fungal mycelia. Each one of these cells is in chemical conversation with those around it. See resources in the background section for more fascinating connections to expand upon here!
- **Human impacts & climate change:** We are missing a "humans" card in the web! At the beginning of the activity, you asked your group about other impacts that might play a role in this web. Both historical and current humans impact forests in profound ways that ripple throughout the forest ecosystem - yet many of these impacts go unnoticed by many of us. These impacts tell a powerful story. So far, the web that we are representing is more a look into history than what many of our forests look like today.



- Historically, the native grasses in these forests carried fire across these landscapes as frequent burns (every 15-40 years) left a patchwork of disturbance. This **patchwork** helped the forest survive future fires by breaking up the landscape. Many Tribes facilitated these burns and supported the role of fire on the landscape.
 1. In the last few centuries, humans have altered these forests significantly. But how?
 2. European settlement disrupted traditional fall and spring burning practices by removal of Indigenous peoples and suppression of Indigenous practices.
 3. Then came railroads and roads, which acted as fire breaks, interrupting the flow of fire across the landscape. Meanwhile, domestic livestock and sheep consumed much of the native grasses, further preventing wildfire from moving through the understory and clear the forest floor.
 4. Then came the big burn in 1910, which was a huge wildfire the size of the state of Connecticut, which burned from eastern Washington to western Montana. At this point, wildfire became public enemy number. We then sought to put out every wildfire and were quite good at it - we put out 95-98% of fires in the US for decades to come.
 5. Then we add in timber harvesting, which selectively removed the largest trees that had resisted fire for centuries (such as the large old ponderosa pines in our web). They were replaced by less fire resistant, younger trees (such as the white fir in our web that was previously cleared by fire).
 6. In dry forests especially, this history has changed the landscape dramatically. Some of these forests look quite different than they did 150 years ago. Note: although wet forests to the west of the cascades were also heavily impacted by logging and other human impacts, Some forests burn more often and more intensely than others. Forest stands composed primarily of fire-susceptible species (e.g. western hemlock, subalpine fir, and Engelmann spruce) will have higher mortality than stands composed of more fire-resistant species, such as mature Douglas-fir and western larch. Because the fire return interval is much slower in wet forests west of the Cascades, fire suppression has had a less dramatic impact in this region.
 7. Consider asking a few deeper discussion questions: Were you aware of the human histories that our forests hold? Were you surprised by these impacts? What kind of reaction do these impacts bring up for you?



8. Clearly, our web has undergone some dramatic transformations over a period of time that, for a forest, would be the blink of an eye. Today, we are seeing emerging impacts from a new type of human impact: climate change. Choose from several of the following examples and ask your group how they imagine these impacts might ripple through the web, keeping these historic impacts in mind:
- Forests are getting drier, hotter and windier across the American West. More variable precipitation and earlier snowpack melt means that trees are becoming stressed by lower water availability. In the Pacific Northwest, the size, duration, and number of wildfires are increasing. It is estimated climate change contributed to an additional 4.2 million acres of forest fires during 1984–2015 (double the expected area).
 1. While postfire habitat in eastern Washington and Oregon has increased since 1980, most of it is concentrated in a few watersheds that have experienced large-scale, high-intensity wildfire, producing patterns that do not benefit postfire species as much as the patterns produced by historical mixed-severity fire regimes.
 - **Seasonal events** such as spring blooms and snowmelt are shifting and some species, like the mountain pine beetle, are able to reproduce more often and in larger numbers, preying on abundant drought-stressed trees
 - Meanwhile, the area occupied by invasive species, insect outbreaks, disease, and abnormal fire susceptibility (such as crown fire potential) have increased
 - **Who's holding the web?** As we said earlier, there is no “human” card in this web. However, we do have a whole group of humans here, literally holding this web up and supporting it. How are we connected to these forests? Why do we need these webs to remain intact - how are we linked to these forest ecosystems and how do they help us become more resilient to climate change? Discuss some of the many natural benefits that forests offer us, from clean air and drinkable water to pollination of our crops and the vital mental and emotional support that we get from time in nature.
 - **Stewardship connection:** Now that you know this history and the challenges that these landscapes are facing due to these human impacts, we have an opportunity to improve both our public lands and our own communities' resilience. What could make these systems more resilient to climate impacts? This discussion offers a transition towards introducing an event or stewardship project that your Broadband is hosting.



- Answers include increasing habitat connectivity, which would allow space for wildlife to adapt to harsher conditions and migrate if need be. Or allowing some low-severity wildfires to exist on the landscape in order to restore some of the historic patchwork landscape.
- We can also help forests regain climate resilience by maintaining large, old trees, snags, and down logs, which help maintain the old forest functions.
- Helping forests maintain or recover these characteristics is important because existing old forest stands may experience disturbance. Expanding the mosaic of old forest conditions is likely to be increasingly important for old forest wildlife conservation under future climate change scenarios.

Salvage logging transition:

We now know that wildfires are playing a larger role on the landscape every year. But there is actually another human impact that we have not addressed yet - *what would happen if we cleared many of the trees immediately after a fire?* This offers a great opportunity to introduce the importance of forest management in how we respond to fire. Allowing a forest to rejuvenate naturally vs. mechanical intervention. Your group might have a wide variety of perspectives on this topic. This question allows you to transition towards the **Post-Wildfire Logging Citizens Panel Activity** if you are facilitating the two activities together. If not, consider reading the background info so that you can offer your group insights about the impacts that post-fire logging would have on the ecosystem web.

Facilitation Guidelines:

To really engage your group with the full significance of this activity, use guiding questions and be responsive to the topics and connections that your group is bringing up naturally. You don't have to spend a lengthy amount of time on each question, maybe just hear from one or two members of the group. One of the challenges (and skills!) of facilitation that we build with practice is striking a balance between teaching and questioning. We are offering groups new information but also ensuring that they are an active part of the knowledge building process.

Modifications:

To add in a fun challenge and build stronger relationships among your group members, add a guessing game lead-in to the activity! Before passing out the cards, explain that everyone will hold the picture of their organism on their forehead (no peeking!) and ask other members of the group yes or no questions until they identify what they are! Some cards are easier than others. If you have children in your group, give them help brainstorming questions to narrow down the options. Do you have four legs? Are you bigger than a shoe box?

Curriculum Source Credit:

This activity is a widely recycled/repurposed environmental education activity that has been tailored for the Great Old Broads audience.