**\*\*Park Name**

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| --- |
| [Olympic National Park](http://www.nps.gov/olym/index.htm) |

**\*\*Lesson Plan Title (255 characters maximum)**

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| --- |
| Freeing the Elwha (Aspect and Soil Moisture) |

**\*\*Essential Question and Quick Lesson Description**

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| --- |
| What combination of factors both natural and manmade is necessary for healthy river restoration and how does this enhance the sustainability of natural and human communities? |

**\*\*Lesson Grade Level: (Check One of the following)**

Sixth-Eighth Grade

**\*\*Lesson Subject: (Check As Many as Apply)**

Science

**Feature Image for Lesson**

**This will be shown next to your lesson on the Education Portal. Provide filename and location below.**

|  |
| --- |
| <http://www.nps.gov/common/uploads/teachers/assets/images/pwr/park/olym/5BB8343D-155D-4519-3EB2218DA6586CAB/5BB8343D-155D-4519-3EB2218DA6586CAB.jpg> |

**Alt Text for Feature Image**

**If the image does not display, what description do you want to appear in its place?**

|  |
| --- |
| What role do aspect, slope, sun, snow melt, blackbody absorption and elevation play in soil moisture conditions and why is soil moisture important to the structure of an ecosystem? |

**\*\*Common Core Standards:**

**Want more information about Common Core? Go to** [**http://www.corestandards.org/**](http:///h)

|  |
| --- |
| **Grade Level:** 6-8 **Subject Area:** Science  **Common Core Standards:**  RST.6-8.1 - Cite specific textual evidence to support analysis of science and technical texts.  WHST.6-8.2 - Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. |

**\*\*State Standards:**

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| **State:** WA **Subject :** Science **Grade Level:** 6-8  **State Standards:**  EALR 4: 6-8 LS2C, EALR 4: 6-8 LS2D  Reading  EALR 1: Component 1.2  Social Studies  EALR 5: Component 5.2  Writing  EALR 2: Component 2.1 |

**Additional Standards(s) (255 characters maximum): Does this lesson meet additional standards?**

**e.g. Next Generation Science Standards, National Council for Social Studies Standards, Advanced Placement (AP) Courses, International Baccalaureate (IB) Courses, Next Generation Science Standards**

|  |
| --- |
| Next Generation Science:  MS-ESS2-2. Construct an explanation based on evidence for how geoscience processes have changed Earth’s surface at varying time and spatial scales. |

**Thinking Skills (Check As Many as Apply)**

The thinking skills listed below are based on Bloom’s Taxonomy. Consider your lesson procedure and activities. Then check off the thinking skills that students will experience through your lesson.

X **Knowledge** – Recalling or recognizing information ideas, and principles

X **Comprehension** – Understand the main idea of material heard, viewed, or read. Interpret or

summarize the ideas in own words.

X **Application** – Apply an abstract idea in a concrete situation to solve a problem or relate it to a

prior experience.

X **Analysis** – Break down a concept or idea into parts and show the relationships among the parts.

\_\_\_ **Creation** – Bring together parts (elements, compounds) of knowledge to form a whole and build

relationships for NEW situations.

\_\_\_ **Evaluation** – Make informed judgments about the value of ideas or materials. Use standards and

criteria to support opinions and views.

**Complete Lesson File**

**Is there a downloadable file (or PDF) for this lesson plan? If yes, provide filename and location:**

**Be sure your PDF or other file meets universal accessibility requirements, most PDFs do not.**

|  |
| --- |
| <http://www.nps.gov/olym/forteachers/classrooms/loader.cfm?csModule=security/getfile&pageid=600178> |

**Lesson Duration**

**Time to complete this lesson plan in minutes (25 characters maximum)**

|  |
| --- |
| 60 minutes |

**\*\*Background Information for Teacher**

**What important content, contextual, or practical information and background knowledge does the teacher need to successfully implement this lesson?**

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| This lesson focuses on the role of aspect, slope, seasonal sun availability, snow melt, blackbody absorption, and elevation in soil moisture conditions. Soil moisture is one of the most important factors determining the composition of plant communities and ultimately the ecosystem structure. The amount of snowpack and the amount of time it takes to melt off each summer impacts the growing season and the ability of trees to survive. Where trees can no longer survive, alpine meadows predominate, but soil moisture conditions determine whether they are "wet" or "dry" meadows. |

**\*\*Important Vocabulary and Terms with Definitions:**

**What terms and academic language will students have to know to participate in the lesson? Lessons typically include 5 to 15 terms and definitions.**

|  |
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| 1. Aspect: The direction a slope faces 2. Snowpack: The seasonal accumulation of snow in the winter that is available for melting in the spring and summer. 3. Solstice: Either of two times of the year when the sun is at its greatest distance from the celestial equator. The summer solstice in the Northern Hemisphere occurs about June 21, when the sun is in the zenith at the tropic of Cancer; the winter solstice occurs about December 21, when the sun is over the tropic of Capricorn. The summer solstice is the longest day of the year and the winter solstice is the shortest. 4. Equinox: Either of the two corresponding moments of the year when the Sun is directly above the Earth's equator. The vernal equinox occurs on March 20 or 21 and the autumnal equinox on September 22 or 23, marking the beginning of spring and autumn, respectively, in the Northern Hemisphere (and the reverse in the Southern Hemisphere). The days on which an equinox falls have about equal periods of sunlight and darkness. 5. Analemma: A graduated scale in the shape of a figure eight, indicating the sun's declination and the equation of time for every day of the year and usually found on sundials and globes. 6. Blackbody absorption: an ideal black substance that absorbs all and reflects none of the radiant energy falling on it. |

**\*\*Lesson Preparation: What preparation does the teacher need to do before the lesson? What supplies or materials should be gathered?**

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| The teacher should review the background information and have the Aspect and Soil Moisture Powerpoint available as well as the Aspect and Soil Moisture worksheet. There should also be copies of the Demonstration/Lab Activity Sheet available and the materials needed: metal or glass pan, shaved ice, black rubber stopper or another dark object, freezer and/or refrigerator, and an electric lamp with a hot light bulb. |

**\*\*Lesson Hook or Preview: What activity, video, song, or other experience could get the students excited about the lesson and thinking about the topic? Is there a way to make the lesson important to their lives or link the lesson content to what they already know?**

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**\*\*Procedure: List the instructions the teacher should follow as Step One, Step Two, Step Three, etc.**

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| 1. Review the Essential Question. Introduce the guiding question. 2. Students should take a few minutes to respond to the first reflection prompts. Discuss their answers and any questions they’ve generated. 3. Hand out the Vocabulary Notes. With this lesson you may want to define the words before presenting the PowerPoint Lesson. 4. Present the PowerPoint Lesson. 5. Run demonstration on blackbody radiation absorption. 6. Have students use the “sun motion simulator” to illustrate the concepts of aspect and shadows and the impact of latitude on seasonal solar radiation. <http://astro.unl.edu/naap/motion3/animations/sunmotions.swf> 7. Hand out the second Reflection Journal Page. Give students time for a final reflection on the lesson. |

**\*\*Assessment: How can teachers tell that each individual student has met the objective? How will teachers see if each student knows the answer to the essential questions or has mastered the skills? Below, include below a brief description of how to use the assessment. Later in this template you are provided with the opportunity to upload a digital copy of the assessment for teachers to print and use.**

|  |
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| The assessment will require students to not only recall important terms in the lesson, but also to reflect on what was taught. They will also have to use what they have learned to answer questions that are applicable to their own understanding of soil moisture and its effect on tree growth. |

**Lesson Materials: Any worksheets, photos, primary source, scientific data, maps, graphic organizers, or PowerPoint ‘s should be described and attached using the template below. Please create additional materials boxes if necessary.**

**Material #1**

**Title (255 characters maximum):**

|  |
| --- |
| Aspect and Soil Moisture PowerPoint |

**Summary (how does the material function in the lesson?):**

|  |
| --- |
| The presentation provides visual examples of key terms and explains other aspects of the material to be taught. |

**Downloadable file of this material in original format if possible, such as Microsoft word or PowerPoint (Provide filename and location)**

|  |
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| [**Lesson7-AspectandSoilMoisture.pptx**](http://www.nps.gov/olym/forteachers/classrooms/loader.cfm?csModule=security/getfile&pageid=600179) |

**Material #2**

**Title (255 characters maximum):**

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| --- |
| Elwha River Restoration Aspect and Soil Moisture Reflection Journals |

**Summary (how does the material function in the lesson?):**

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| --- |
| Will allow student to record personal thoughts on the lesson. |

**Downloadable file of this material in original format if possible, such as Microsoft word or PowerPoint (Provide filename and location)**

|  |
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| Available on the downloadable lesson plan |

**Material #3**

**Title (255 characters maximum):**

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| --- |
| Sun Motion Simulator |

**Summary (how does the material function in the lesson?):**

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| --- |
| Illustrates the concepts of aspect and shadows and the impact of latitude on seasonal solar radiation. |

**Downloadable file of this material in original format if possible, such as Microsoft word or PowerPoint (Provide filename and location)**

|  |
| --- |
| <http://astro.unl.edu/naap/motion3/animations/sunmotions.swf> |

**Assessment Materials**

**How can teachers tell that each individual student has met the objective? How will teachers see if each student knows the answer to the essential questions or has mastered the skills? Attach below the assessment and, if applicable, a rubric or answer key.**

**Assessment**

**Title (255 characters maximum):**

|  |
| --- |
| Aspect and Soil Moisture Reflection Journals |

**Summary (how does the material function in the lesson?):**

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| The material allows the teacher to see how well students can analyze the information taught, evaluate its merits and apply the information to their own thinking. |

**Downloadable file of this material in original format if possible, such as Microsoft word or PowerPoint (Provide filename and location)**

|  |
| --- |
| separate document |

**Assessment Rubric or Answer Key**

**Title (255 characters maximum):**

|  |
| --- |
| N/A |

**Summary (how does the material function in the lesson?):**

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|  |

**Downloadable file of this material in original format if possible, such as Microsoft word or PowerPoint (Provide filename and location)**

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**Supports for Struggling Learners**

**If a learner is struggling to understand the objective, essential question, or skills presented in the lesson, what can be done to help this learner? Is there a lower reading level version of text? Is there a more image heavy or simplified version of content? Can supportive devices be provided such as calculators?**

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| --- |
| N/A |

**Extensions for Excelling Learners**

**If a learner is really excelling at the objective and skills presented in the lesson, what can be done to continue to challenge this learner? Can the student create a product or learn more in depth about the content?**

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| --- |
| N/A |

**Additional Resources**

**Please list websites, references, or other materials for further research by interested students that is not already provided within the lesson.**

|  |
| --- |
| SOIL AND THE ENVIRONMENT  <http://soils.gsfc.nasa.gov/ped/spheres.gif>  ANALEMMA  <http://spaceplace.nasa.gov/en/educators/NMP_timekeeping.pdf> |

**Related Lessons or Educational Materials**

**Is this lesson connected to other lessons within a unit? Is this lesson related to a field trip guide or activity? If so, list the website address or titled of these other materials below.**

|  |
| --- |
| N/A |