Forest Ecology and Biofuel Production Potential for Tribally-Managed Forests in the Northern Rockies

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Introduction

For centuries the tribes of the northern Rockies utilized prescribed fires to maintain healthy forests. Small, frequent, controlled fires reduced the amount of biomass accumulation in the forest, thereby reducing the risk for catastrophic wildfires. A more recent forest management practice adopted by the tribes is the use of mechanical thinning. This four lesson curriculum develops a students understanding of how these two practices create healthy forests and biofuel potential.

Objectives

To develop student understanding of holistic approaches to forest management and the biofuel potential of woody biomass in the forests of the Northern Rockies.

Students assessing biomass accumulation in the forest

Lesson One

Students will learn the history of the Confederated Salish Kootenai Tribes (CSKT) historical relationship to prescribed fire and their modern use of mechanical thinning. Lesson one focuses primarily on:

- Historical vs. Modern forest densities.
- Historical vs. modern fire suppression tactics.
- Historical vs. modern forest health.

Lesson one PowerPoint presentation provided for teachers.

Lesson Two

Students building simulated forests

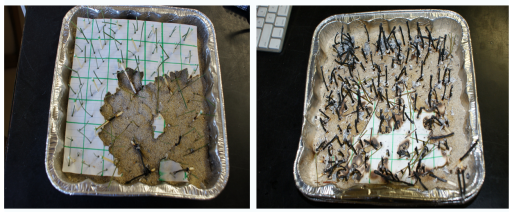
Students compare the burn times and overall damage of two simulated forests after being ignited, one that is a "pre-European" forest and one that is a "post-European" forest.

"Pre-European" Simulated Forest:

- Each 1" square of the grid gets 2 "live trees" (pine needles).
- Every other 1" square of the grid gets 1 "dead tree" (match stick).

"Post-European" Simulated Forest

- Each 1" square of the grid gets 4 "live trees" (pine needles)
- Each 1" square of the grid gets 3 "dead trees (matchsticks).



Damage done to "Pre-European" forest (left) and "Post-European" forest (right) after a wildfire

Lesson Three

In lesson three, students will "manage" an imaginary plot of land. Using CSKT data on the density of woody biomass in their managed forests, students will determine how much jet fuel could be produced by the biomass on their plot. Note that 1.1 metric tons of woody biomass can be turned into .21 metric tons of isobutanol, giving a conversion rate of 18.91%.

Example
45 acres of land
25 tons of woody biomass per acre
25 x 45 = 1125 tons of woody biomass
.1891 x 1125 = 212.81 tons of isobutanol.

Lesson Four

In lesson four, students summarize the information gained in the previous three lessons in a poster that covers the following questions:

- What is the plausibility of mass biofuel production?
- How do tribal forest management practices create biofuel production potential?
- Do traditional tribal forest management practices maintain healthier forests? Why or why not?
- How/why should tribal forest management practices be implemented into modern forestry?

Conclusions and Recommendations

Although the level of math knowledge required for these four lessons makes them most appropriate for 8th-10th grade, the concepts of holistic forest management can be translated to many different grade levels. This curriculum is meant to illustrate how tribal forest management practices can create biofuel potential as well as healthier forests. By promoting NARA's biofuel production principles through engaging, hands on learning we can help to create a generation of energy literate scholars.

Students giving their final thoughts on the biofuel potential provided by mechanical thinning

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