LASSI Lesson Plan

Computer Science Integration

Fire & Beetle Ecology

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**Goals:** Students will be able to relate computer science and engineering practices to ecological management, specifically focusing on the relationship between fires & beetle kill.

**Objectives: Students will be able to:**

1. Describe spreading differences in fire patterns based on variable mountain beetle populations and wind conditions.
2. Relate computer science and programming to ecology applications.

**Lesson Activity:**

1. Preparation: Download NetLogo (See https://ccl.northwestern.edu/netlogo/5.1.0/) & the fire-beetle ecology program onto all class computers prior to instruction (Search ‘Fire\_CBKN’ in Modeling Commons modified from Uri Wilensky: http://modelingcommons.org/account/login).
2. Pre-test: 1) How do mountain pine beetle populations impact fire ecology?, 2) How could programming and computer science be used to study this relationship?
3. Students open the fire-beetle ecology (Fire\_CBKN) program in NetLogo.
4. Science Journaling Assignment: Students investigate and describe how changing program variables impact fire spreading patterns. Specifically answering:
   1. What happens if all variables are set to lowest condition/level?
   2. How does wind direction and strength impact fire spreading patterns?
   3. What happens as the percentage of beetle kill increases?
   4. How is the rate (based on number of ticks) of fire spreading impacted by increased beetle kill, alone?
   5. How is the rate (based on number of ticks)of fire spreading impacted by wind speed and direction, alone?
   6. How is the rate (based on number of ticks)of fire spreading impacted by both high beetle kill and wind strength?
   7. How could this model/program be improved?
   8. How can computer modeling help fire & forest ecologists?
5. Post-test: 1) How do mountain pine beetle populations impact fire ecology?, 2) How could programming and computer science be used to study this relationship?