

7. Use the data you have collected to make a line graph that shows how the number of plots in all five categories has changed over the course of the seven years that you ran this simulation. Label the scale on the x-axis with the number of years that have gone by. Label the y-axis from 1 to 16 for the number of plots. Create a key to show what category of forest health each line represents.

Explain

1. Share your group results with your class and compare your graphs with other student groups' graphs. You can use a gallery walk strategy to accomplish this sharing.
2. Summarize what happened to your forest plot over a span of seven years. Did everyone have the same result?
3. In addition to the loss of the primary growth forest, what effect do you think this activity had on the soil? Animals? Humans?
4. This simulation showed the effects on a primary growth forest by subsistence farmers. These farmers generally do not have bulldozers or other heavy equipment. How would a forest production company that had money to spend on heavy equipment change the scenario? How might you change this simulation to show the effects of a different type of production?
5. What are the strengths and weaknesses of this simulation (model)?

Explore

Part 1.

1. Everyone should have the following materials: plastic baggie with beans, deforestation simulation board, and 3 envelopes (plot cards, sustenance farming cards, secondary farming cards), and a lab packet (Blackline Master 2).
2. Set up your forest by placing 7 dried beans on each of the 16 squares on Blackline Master 3: Deforestation Simulation Board. Each square represents a plot of healthy primary forest. Each bean represents a portion of the healthy forest that lives on that plot of land.

Part 2.

1. You will begin by simulating what might happen if there is a group of four subsistence farmers living in your forest for 7 years. Follow steps 2 through 6 to do this.
2. Mix the forest plot cards around in the envelope. Select a plot card and remove two beans from the corresponding numbered forest plot on Blackline Master 3. Record the plot number on your data sheet. Your Subsistence Farmer Co-Op has just begun to cut and clear land for their farms. You will pull a total of 8 forest plot cards to simulate the amount of trees they have removed from your forest during one year's time.
3. Return the plot card to the envelope. Repeat Step 2 seven more times to show how the Farmer's Co-Op expands their operation over time. Remember to remove two beans each time you select a plot card. If there is only one bean in the plot of land corresponding to the card you draw, remove that bean and randomly remove a bean from a nearby plot of land. This represents the fact that your farmer co-op group has moved to a neighboring plot to expand their farm. If no beans remain in the plot of land corresponding to the card you draw, randomly remove two beans from another adjoining plot of land. Make sure you put the plot card back in the envelope after each draw. (NOTE: If you have laminated the simulation board, you can have students keep track of how many years each of your subsistence farming plots have been farmed. This will make it easier to know when to replace this label with secondary forest growth).
4. At the end of 8 draws, observe the condition of your forest. Are there any areas that are completely clear of forest? For plots that have zero beans remaining, place a Subsistence Farming square on each of these plots. These plots represent cleared land under subsistence cultivation by the Farmer's Co-Op.
5. In a data table, record the number of beans in each of the 16 forest plots. Count and record the number of plots that are:
 - **healthy old-growth primary forest** (plots with seven beans),
 - **impacted primary forest** (plots with four, five or six beans),
 - **endangered primary forest** (plots with one, two or three beans),
 - **subsistence farming plots** (plots that have zero beans after Step 3; since this is the first year a plot is in subsistence farming, mark a 0-x), and
 - **barren soil/secondary forest begins to grow plot** (subsistence farming fails after three years, plot converts to barren soil)
6. Repeat steps 2 through 5 a total of 6 more times to simulate a seven years of data on your forest plot. Make sure you record the remaining trees (beans) left at the end of the year and condition of your forest in the data table. On the data chart, mark a 0-x,x for subsistence plots that are now in their second year, and 0-x,x,x for those in their last year of subsistence farming. These plots will convert to secondary forest growth the next year – and so they will be marked 0-2nd forest until the end of the simulation.