Scenarios for PINEMAP Simulations

Robert Teskey

Science Presentation

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United States Department of Agriculture

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What are Scenarios?

- Scenarios are an organized set of plausible future conditions and situations that can be used to focus and organize model simulations.

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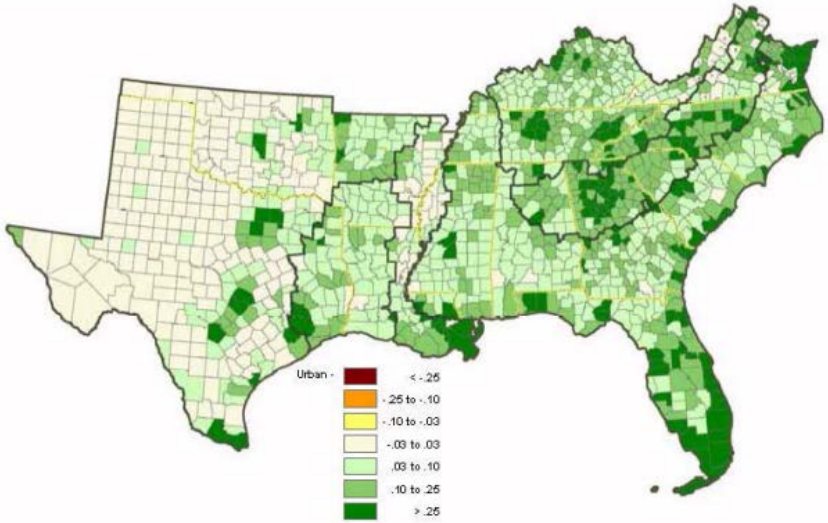
PINEMAP Goals

- An important goal of PINEMAP is to increase carbon sequestration by loblolly pine plantations by 15% by the year 2030.

- We will use scenarios to evaluate carbon sequestration in this time period, as well as later in the 21st Century.

Four essential Components of PINEMAP Scenarios

- 1. **Land use**: The amount of land in loblolly pine plantations may increase, decrease or stay the same depending on economic factors.



- This map is an example of possible losses of forest land by 2060, mostly from urbanization, if the population grows rapidly in the region. More loss is shown by a darker green color. From Wear & Greis (2012) USDA FS Gen. Tech. Rep. SRS-GTR-168.

Four essential Components of PINEMAP Scenarios

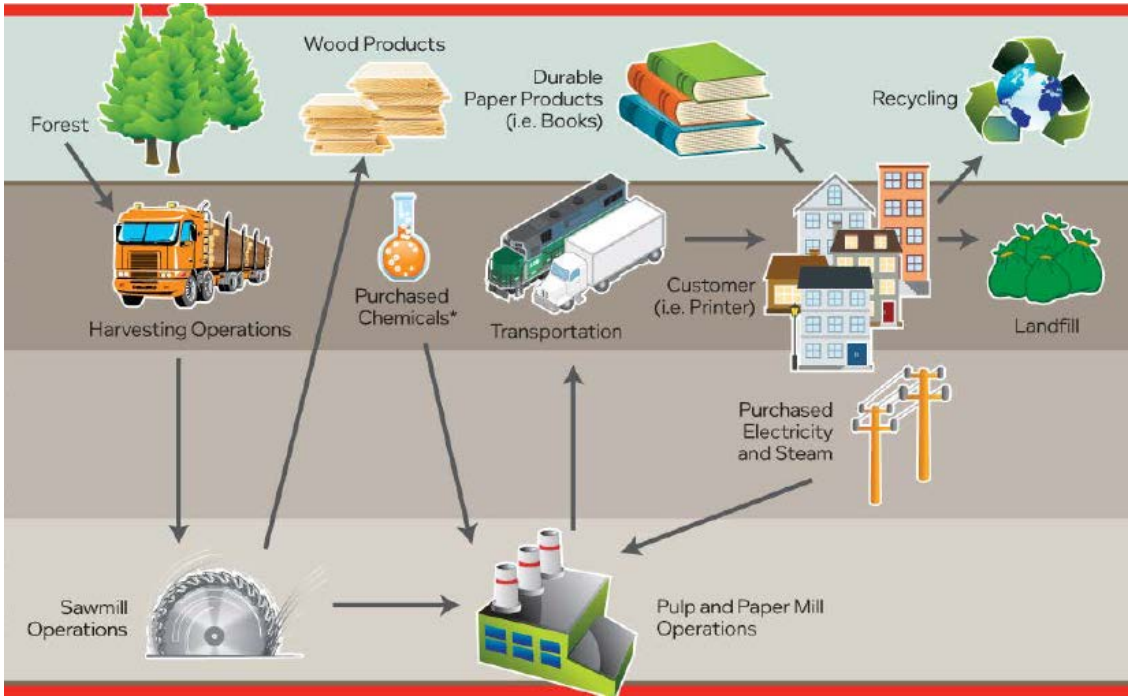
- 2. **<u>Productivity / Management Intensity</u>**: In the future, the amount of carbon produced from loblolly pine plantations could increase, decrease or stay the same, compared to the present time.

Carbon Sequestration

- Stored carbon depends on many factors in addition to stand productivity, including types of wood products, how much wood is used for energy production, and on-site carbon storage

- Stored Carbon (Carbon sinks)

- Greenhouse gas emissions (Carbon sources)



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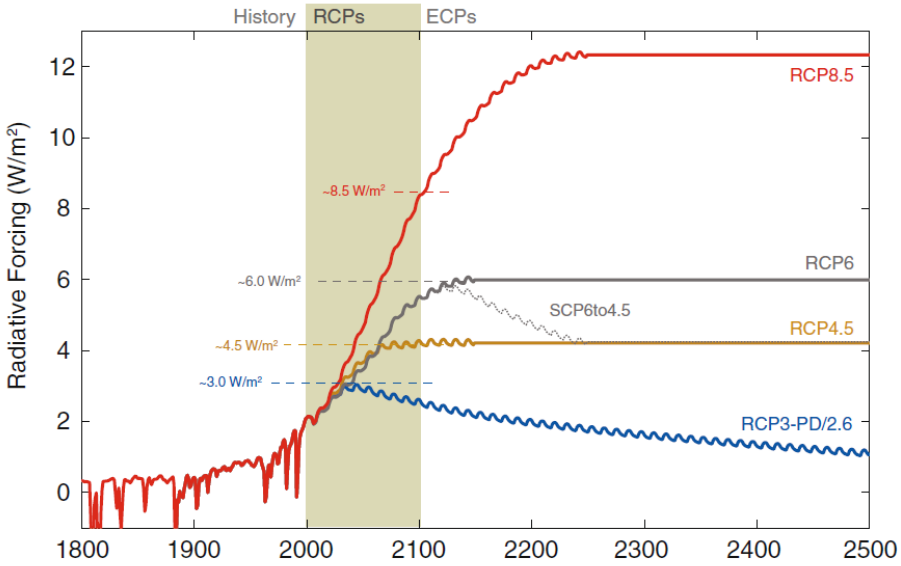
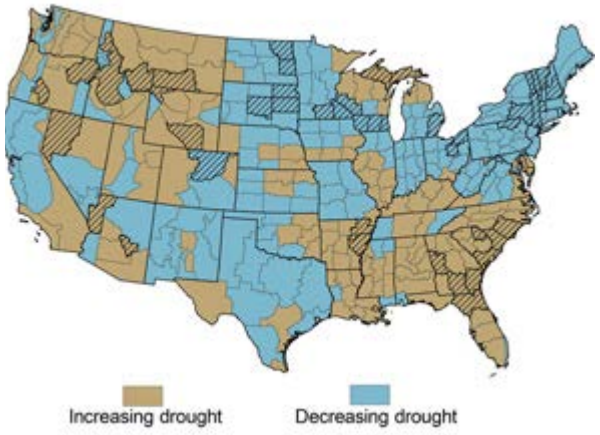
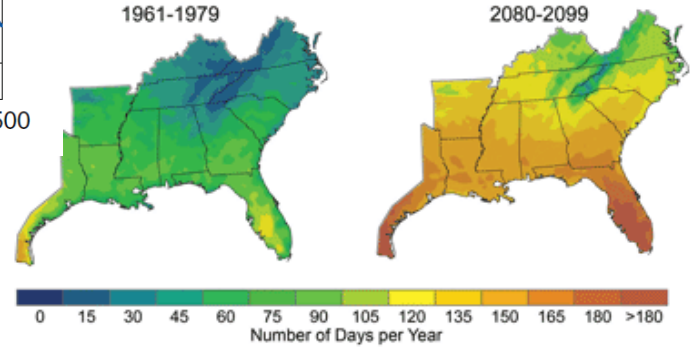
- 3. **Environment**: Climatic conditions (precipitation, temperature) and atmospheric CO_2 concentrations that alter plantation productivity.





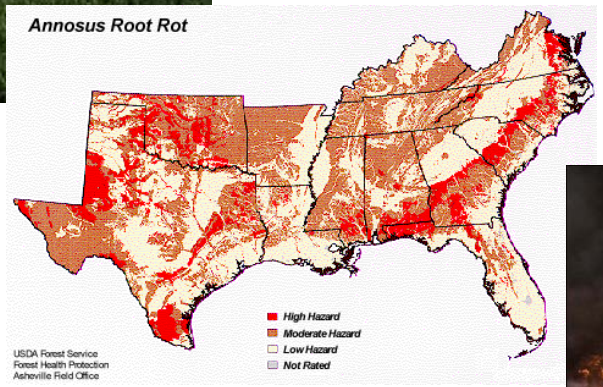


Four essential Components of PINEMAP Scenarios

- 4. **Disturbance**: Various biotic and abiotic disturbances reduce plantation productivity.

Insects

Pathogens



Fire & Wind

Levels of change in the essential components

- The scenarios we will use lay within a matrix of combinations of the potential levels of change of the four essential components (land use, productivity, environment and disturbance).

- These levels are simply represented by numbers:

  -1, 0, 1, 2 and 3.

- Each number represents a change in a component that the consensus of expert opinion of the PINEMAP scientists think is realistic and justifiable.

Near-Term Scenario Combinations

- Combinations of likely scenario components in the near future (up to year 2030):

Land Use	-1	-1	-1	-1	0	0	0	0	1	1	1	1
Productivity	-1	0	1	2	-1	0	1	2	-1	0	1	2
Environment	0	0	0	0	0	0	0	0	0	0	0	0
Disturbance	0	0	0	0	0	0	0	0	0	0	0	0

- The scenarios we use to evaluate future conditions will be selected by PINEMAP scientists based on expert opinion.

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Scenarios for later in the 21st Century

- Must include changes in the Environment and an increase in disturbance.

- An example of unique scenario combinations for one level of land use:

Land Use	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Productivity	-1	0	1	2	-1	0	1	2	-1	0	1	2	-1	0	1	2
Environment	1	1	1	1	2	2	2	2	1	1	1	1	2	2	2	2
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Disturbance	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

Future Activities

- Refine scenario component levels through expert opinion
- Make model runs to establish how much carbon can be sequestered under different conditions
- Develop recommendations for optimum management activities to increase carbon sequestration for different types of land-owners
- Develop N use scenarios