

Global warming may spur increased growth in Pacific Northwest forests

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Global warming in the next century could cause a significant increase in the productivity of high-elevation forests of the Pacific Northwest, a new study suggests. However, forests at lower elevations - which in recent years have accounted for more than 80 percent of the region's timber harvest - could face a decline in growth.

The potential changes, which are based on the projections of computer models, would be most pronounced in Washington. In that state, high-elevation forests could see their productivity increase substantially, from 35 percent a year to as much as 500 percent, depending on which climate scenario is used.

In Oregon, similar elevations might see more modest forest growth increases of 9 to 75 percent.

Overall, forest productivity could increase about 7 percent annually in forests west of the Cascade Range and 20 percent in forests east of them, in conclusions based on one climate scenario that largely reflects current trends of energy use, globalization and economic growth. However, management practices, genetic limitations, and changes in natural disturbances such as disease, insects and fire were not included in the study, and can also affect productivity.

These findings analyzed changes in forest productivity further into the future than most previous work, and were just published in *Forest Ecology and Management*, a professional journal, by researchers from the College of Forestry at Oregon State University and the Pacific Northwest Research Station.

"There's a lot of variability here, depending on which climate scenario turns out to be most accurate and what policy changes are made as a result," said Darius Adams, a professor of forest economics at OSU. "And there are dramatic differences in forest regions and elevations. Clearly

the forest growth is likely to increase the most at higher elevations, but it's worth noting that those forests never had very high growth rates to start with."

According to Greg Latta, an OSU faculty research assistant and principal investigator on the study, most of the climate scenarios that were used showed increases in temperatures - from one to eight degrees - but precipitation projections were all over the map, sometimes up and sometimes down. At lower elevations, tree growth is constrained when moisture is limited and drought stress is an issue.

"The lower-elevation forests are getting warmer just like those at higher elevations, but in most scenarios the precipitation doesn't increase enough there to offset that," Latta said. "The cumulative effect could be declines in forest growth of 1 to 3 percent a year in low-elevation Oregon forests, which could have a substantial long-term impact if trees are being managed for timber harvest."

Among the findings of the study:

- Any climate scenario that shows an increase in future temperatures could potentially lead to an overall increase in forest productivity in the Pacific Northwest, especially in Washington.
- Increases in high-elevation forest productivity were partially offset by probable declines in lower-elevation forest productivity.
- Private timber lands that have accounted for 83 percent of the timber harvest in this region over the past decade are concentrated at lower elevations.

- The models showed that increases in forest growth at higher elevations could increase carbon sequestration for those areas, but they did not include potential changes in fire frequency and severity, which are also affected by biomass accumulation.
- Other possible changes not reflected in the productivity projections were disturbance regimes such as diseases and insect outbreaks that are also affected by climate.
- The combination of tree mortality and declining future growth on private timberlands could lead to concerns about lower harvest levels and reduced carbon sequestration in the future.
- Responses to these projected future changes may depend largely on who owns the land, since private and public landowners often have different management objectives.

Forest productivity is important to consider for a range of issues, the researchers noted in their study, including potential timber harvest, habitat for wildlife, fuels that increase fire risk, carbon sequestration and other issues.

The study is also now being extended into Alaska, the researchers said.

"Water availability turned out to be an important factor for much of Oregon and Washington," said Tara Barrett, a co-author and research scientist with the U.S. Forest Service. "We're extending the project to coastal Alaska, where length of growing season is likely to be a more important factor than water availability, so it will be interesting to see if results are similar for that region."

Forests and their potential growth may also play a significant role in future mitigation efforts to reduce greenhouse warming and the use of "carbon credits," experts say.

Source: Oregon State University ([news](#) : [web](#))

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