

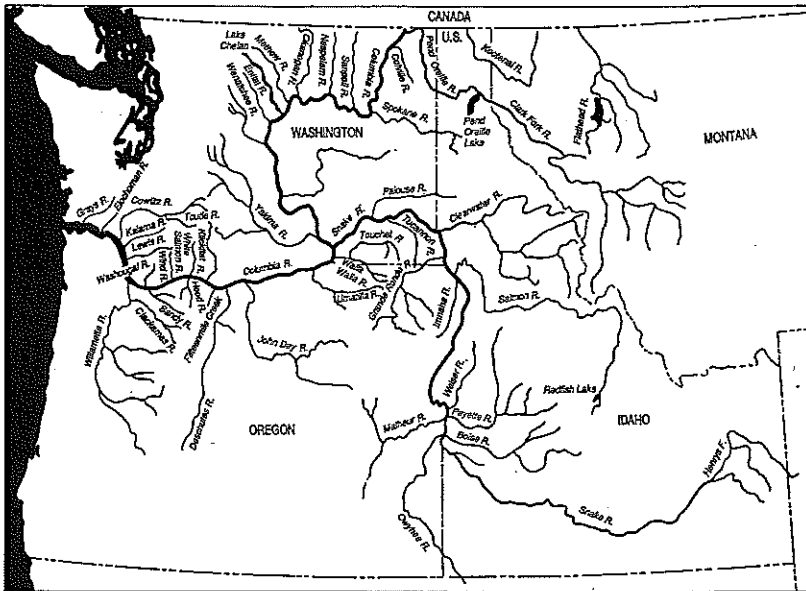
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Predicting Climate Change for the Pacific Northwest 169

C. Leovy and E. S. Sarachik

Determining the nature and extent of greenhouse warming is a difficult problem because the global climate system is complex and influenced by many factors. The authors show that climate warming is a certainty, but that much uncertainty surrounds predicting *how much and when*. They present the theoretical basis of the global

Research Notes and Comments

The Northwest Environmental Journal solicits research notes on special topics to explain work in progress, recently completed, or anticipated. The following notes are indicative of the types of research being done on the effects of global climate change, focusing on northwestern North America, rather than an exhaustive survey of ongoing programs.

Global Climate Change: Focus on Northwestern North America

Terrestrial and Atmospheric Research

The Carbon Balance of Forests in British Columbia

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The goals of our project are to estimate carbon storage in British Columbia's forest ecosystems and to examine the influence of forest harvesting and management on the carbon balance. Preliminary estimates of the uptake of carbon by British Columbia's (B.C.'s) forests have been prepared and a report is in preparation.

Data on the carbon content of soils in forest ecosystems in B.C. are being assembled through reviews of published literature and ecological field-data files. This work is being conducted as a component of two projects designed to assess the influence of forest harvesting and management practices on both short- and long-term carbon balances of specific ecosystems. The review has been completed for coastal old-growth forests. A field study to determine the carbon content of a chronosequence of coastal stands was started in 1991 in cooperation with Forestry Canada. A review of information on carbon content and distribution in northern mixed-wood (aspen-spruce) forests is underway. Field studies were initiated in northern mixed-wood forests in 1991 in collaboration with the University of British Columbia Faculty of Forestry.

Data from these projects will be used to calibrate computer models of carbon and nutrient cycling. These models will be used to examine the potential impacts of forest management practices on car-

bon emissions to the atmosphere and to explore ways in which forest management could increase the capture of carbon dioxide by forests.

Year-to-Year Variations in the Water and Energy Balances of Forest Ecosystems

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A lack of water limits the growth of many forests during the summer in the Pacific Northwest. Computer modeling is used to determine the annual water use of the forests from site and climate data. Measurements of annual growth of the trees and the isotopes of carbon incorporated in the wood are compared with the water-use simulations and with air temperature data. This research provides baseline data which can be used to assess the response of forests to climate change.

The research has shown that the substantial year-to-year variations in water availability result in large inter-annual variations in growth (Robertson, Joza, and Spittlehouse 1990). The annual change in tree basal area varied by 20% about the mean at the sites studied. Relationships developed between water use, air temperature and tree growth will be used to estimate changes in productivity that might occur under a changed climate.

Similar modeling techniques are being used to assess the effect year-to-year variations in weather conditions have on reforestation success (Spittlehouse and Childs 1990). The results indicate that spring planting conditions are more sensitive to changes in climate than those in the fall. Thus improving stock quality and techniques for fall planting would be an appropriate strategy for addressing current climate variability and future changes.

References

- Robertson, E. O., L. A. Joza, and D. L. Spittlehouse. 1990. Estimating Douglas-fir wood production from soil and climate data. *Can. J. For. Res.* 20:357-364.
- Spittlehouse, D. L., and S. W. Childs. 1990. Evaluating the seedling moisture environment after site preparation. Pp. 80-94 in S. P. Gessel, D. S. Lacate, G. F. Weetman, and R. F. Powers, eds. *Sustained productivity of forest soils*. Vancouver, Canada: Faculty of Forestry Publ., Univ. British Columbia.