3.1.5. Plant water relations, hydrology and meteorology - R. H. Waring and S. W. Running, Oregon State University.

In conjunction with J. J. Rogers and W. T. Swank, a mechanistic watershed level hydrology model was completed that incorporates seasonal changes in leaf area and leaf conductance (Waring et al., in press; Rogers et al., submitted).

Climatic data which has been collected over the last three years has been summarized on a daily basis and published with complete description of instruments, analyses, and data processing (Waring et al., in review). These data drive the hydrologic model described by Waring et al. (in press) and Rogers et al. (submitted).

References

Waring R. H., J. J. Rogers, and W. T. Swank. Water relations and hydrologic cycles. In D. E. Reichle (ed.), Contribution to woodland synthesis, Vol. 3, IBP (in press).

Rogers, J. J., R. H. Waring, and W. T. Swank. Synthesis and modeling of the hydrology and water relations of forest ecosystems (submitted to Ecol. Monogr.).

Waring, R. H., H. R. Holbo, and R. P. Bueb. Meteorological data report from the Coniferous Forest Biome primary station on the H. J. Andrews Experimental Forest in Oregon, May 11, 1972 - December 31, 1975. Pacific Northwest Forest and Range Exp. Sta. (in review).

Waring, R. H. Reforestation in the Pacific Northwest (submitted to Land Planning).

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3.1.6. Erosion processes - F. J. Swanson, Oregon State University.

We have continued to monitor the rates of all significant erosion processes operating under forested conditions in the Andrews Forest. A manuscript has been prepared to summarize information on erosion rates of 11 different hillslope and stream channel processes. This work also examines relationships among erosion processes, the influence of vegetation on each erosion process and long-term variation in erosion rates due to wildfire, logging and climate change.

Accelerated mass erosion following logging has been reviewed in a paper (Swanston and Swanson, in press) and examined in detail in watershed 10.

We have continued work on stream processes with particular emphasis on the history and consequences of large organic debris in streams. This work has had important management implications (Swanson et al., submitted), and it has added greatly to our understanding of the coupling between aquatic and terrestrial components of coniferous forest ecosystems.

The history of major perturbations of forest vegetation is being investigated by fire history mapping and analysis of pollen and charcoal horizons in a 7000-year record contained in a core from a marsh. This history of premanagement stand disturbances is essential to the interpretation of long-term management impacts on soil erosion and the stream environment. Essentially, we are attempting to answer the question, "How did nature manage the forest?"

References

Baitis, H. W., and F. J. Swanson. Ocean rise-like basalts from the Galapagos Archipelago. Nature 259:195-197.

Swanson, F. J., and G. W. Lienkaemper. 1975 The history and physical effects and management implications of large organic debris in western Oregon streams. In Logging debris in streams, notes for a workshop. Oregon State University, Corvallis. 18 p.

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Swanston, D. N., and F. J. Swanson. Timber harvesting mass erosion, and steepland forest geomorphology in the Pacific Northwest. In Geomorphology and Engineering. Publications in Geomorphology. Binghamton, New York (in press).

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3.1.7. Carbon, water, and nutrient cycling modeling in old-growth ecosystems - P. Sollins, Oregon State University.

With Stan Clark and several work-study students, we totally reorganized the carbon-water model introducing a systematic coding scheme which a year later still seems adequate. The documentation was revised, graphs and figures prepared, and submitted to the Biome office for publication in December 1975 (Sollins and Swartzman, in press).

Following critical review of the manuscript describing the carbon-water (C-W) model by a variety of people, I rewrote the assumptions and structure part. The behavior part is still in preparation as discussed below.

In 1976 Al Brown and I implemented the C-W model of the CYBER at OSU and began comparing simulated with observed data from watershed 10. As of July 1 we had processed and graphed measured data on snowpack depth, litter moisture, and soil moisture. In the process we discovered several errors and inadequacies in the model which we have fixed. We still must process streamflow, and soil and litter temperature data (none of these had been worked up previously by the data bank). Also we have been comparing certain functions with those in Jim Rogers' model and trying to use some of his better ideas when appropriate. At the University of Washington we performed sensitivity analyses and I have reviewed the results and written up this part of the manuscript.