

Zhu, Zhanxue. 1998. Modeling the effects of harvesting on nutrient cycling and long-term site sustainable productivity.

SUMMARY

In this thesis, a forest soil vegetation atmosphere nutrient cycling model (ForSVAm) was developed and its application to predict the effects of harvesting on nutrient cycling and long-term site sustainable productivity was studied. This was done by

1. Reviewing the published literatures related forest nutrient cycling model and sustainable forest management (Chapter 2);
2. Determining the nutrient cycling model overall structures by analyzing stand level forest ecosystem compartments (Chapter 3);
3. Explore the function of hydrogen on nutrient cycling and quantifying the hydrogen ion net production based on charge balance of elements (Chapter 4);
4. Developing the biomass submodel based on the relationship with temperature, hydrological, and soil nutrients (Chapter 5);
5. Developing the base cation cycling submodel based on the first or the second order chemical reaction and the effects of hydrogen, temperature, and hydrological processes on base cation chemical reaction and nutrient transfer between compartments of forest ecosystem (Chapter 6);
6. Developing the nitrogen cycling submodel based on the first or the second order chemical reaction and the effects of hydrogen, temperature, and hydrological processes on nitrogen mineralization, nitrification, denitrification, and nitrogen transfer between compartments of forest ecosystem (Chapter 7);
7. Developing the sulfur cycling submodel based on the first or the second order chemical reaction and the effects of temperature, and hydrological processes on sulfur chemical reaction and nutrient transfer between compartments of forest ecosystem (Chapter 8);
8. Determining the model parameters based [on] the data from literature review and testing the model reliability by the data from Nashwaak Watershed Experimental Project (Chapter 4, 5, 6, 7, and 8);
9. Applying the developed nutrient cycling model to determine sustainable nutrient harvesting rate at NWEF sites.