1067-92-640 **Natali Hritonenko*** (nahritonenko@pvamu.edu), Department of Mathematics, Prairie View A&M University, Prairie View, TX 77446, **Renan-Ulrich Goetz** (nahritonenko@pvamu.edu), Department of Economics, University of Girona, Girona, Spain, and **Deonica Paxton** (nahritonenko@pvamu.edu), Department of Mathematics, Prairie View A&M University, Prairie View, TX 77446. *Sustainable Forest Management, Logging Size, and Carbon Sequestration Under Climate Changes.*

A mathematical model depicts the forest management problem that considers benefits from timber production and carbon sequestration facing climate changes. It is presented as a boundary value problem for nonlinear partial differential equations with integral terms. The model takes into account the size structure of trees, intra-species competition, and density effects and considers changes of parameters as consequence of climate change. Delay differential equations describe delayed processes of carbon sequestration. The dynamics of climate change is taken from known global scenarios and incorporated in the model. The model is tested on real data on forest in Spain. The objective function includes the revenue from timber production, operational expenses, and profit from carbon sequestration. The dual system is derived and a maximum principle is obtained. The provided qualitative analysis assists in understanding of how environmental changes impact biological processes of forest and carbon sequestration, shows the dynamics of change of carbon price and the optimal logging time under various climate change scenarios, and suggests how management of carbon sequestration and timber production can be adapted to climate changes. (Received September 12, 2010)