PE-13 **Simulation studies on the dynamics of a mangrove *Kandelia obovata* Forest at Manko wetland in Okinawa Island**

○Rempei Suwa[1*], Kangkso Analuddin[2], Akio Hagihara[1]

[1]*Faculty of Science, University of the Ryukyus*
[2]*Graduate school of Engineering and Science, University of the Ryukyus*

The present study reports the simulated dynamics of a mangrove at Manko wetland in Okinawa Island, using the Spatially Explicit Individual-Based Dynamic Global Vegetation Model (SEIB-DGVM). The mangrove consists mainly of young *Kandelia obovata* (S., L.) Yong stands established after 1993, which have changed rapidly in area, tree density and tree size. In previous studies carried out at the present study site, we evaluated the canopy photosynthetic and respiratory process (Khan et al. 2004; Suwa et al. 2006), allometry for estimating the biomass of each organ (Khan et al. 2005; Suwa et al. 2008), phenology (Analuddin et al 2008), the carbon and nitrogen allocation pattern (Khan et al. 2007) and the self-thinning process (Analuddin et al. 2009). On the basis of the abundant ecological knowledge in the present study site, we simulated the forest dynamics for 40 years. The simulation unit for the SEIB model was set at 20-m^2 which was divided into a grid of 0.25-m^2 meshes, with each mesh box accommodating only one individual. The recruitment process was modified to consider the constraints of the light environment on the seedling recruitment process. The recruitment rate (0.25×0.25 m^{-2} yr^{-1}) was expressed as an exponential function of midday photosynthetically active radiation (PAR, μmol photon m^{-2} s^{-1}) at the ground level. The simulation results showed a sharp decrease in tree density with an increase in mean tree weight as the virtual forest grew. This opposite time trend between the tree density and the mean tree weight can be explained by the self-thinning theory. It was confirmed that the simulation results in the tree density-mean tree weight relationship corresponded to the results based on a field research (Analuddin et al. 2009).

Keywords: Biomass; *Kandelia obovata*; Manko wetland; SEIB-DGVM; Self-thinning; Simulation study