Analysis of the Benefits of Carbon Reduction by Trees in Tsing-hua University

With the rapid development of campus affairs recently, the frequent exchanges of teachers and students between the two campuses of Tsing-hua University have increased after the merger, and the space available for use has reduced. The demand for green resources by the teachers and students of our campus has become increasingly intense. Therefore, in order to mitigate global climate change and reduce and manage greenhouse gas emissions as a top priority, the campusis implementing tree conservation actions to reduce the greenhouse effect, to fulfill its responsibility to protect the earth, and to strive toward the goal of a sustainable "Shuimu Tsinghua" campus. Construct a safe, low-carbon, and comfortable high-quality learning, teaching, and research environment.

Trees can absorb the carbon dioxide produced in our campus, perform photosynthesis to release fresh oxygen, produce anions, and emit phenodrine. Trees are a significant contributor to slowing down the greenhouse effect and purifying the air. In addition, suspended particulatesare attached to the leaves of trees; therefore, trees also perform the function of filtering floating dust and purifying the air. A significant amount of fresh oxygen is released by trees during photosynthesis. Moreover, the carbon dioxide absorption of forest land can reach 7.45 to 14.9 metric tons per hectare (Note 1), and the maximum amount of floating dust deposited by leaves can reach 30 to 68 metric tons per hectare (Note 2). Statistically, the number of trees on the campus is approximately 11,000, and the green cover area is approximately40 hectares or more. Estimates show that the carbon reduction is approximately 590 tons (about 1.5 times that of Da'an Forest Park) per year. The effect of reducing suspended particulates in the air is 2,700 tons per year.

In terms of tree conservation, when the fungus *Phellinus noxius* invades the root tissue, it begins to negatively impact the tree, causing decay of wood tissue. The originally strong root becomes fragile and corrupt, affecting the root system and nutrient absorption from the soil

and causing withering and death. It is also likely that the tree would fall because of the decreased support from the roots. As this cannot be easily detected, the tree may fall without warning during strong wind and heavy rain, which may damage houses and vehicles and obstruct traffic. If the tree falls on pedestrians and vehicles in motion, the consequences will be even more disastrous, raising campus security concerns. Therefore, the campus attaches great importance to the prevention and control of the most threatening brown root rot disease in trees. In March 2020, health inspections and risk assessments of trees along the main roads, sidewalks, and parking lots of the campus were conducted. Based on the inspection results, 26 trees were diagnosed with brown root rot disease. There are 7 trees with the disease adjacent to 46 trees, and a 2021 project budget of 1.57 million dollars has been actively compiled for the brown root rot disease prevention and control on the campus. In addition, the campus budgets annually for planting, disease and insect pest control, and tree pruning and maintenance. The beautification work includes the annual budget for pine wood nematode and pine caterpillar control of approximately 500,000 yuan, and the budget for tree pruning and maintenance from 2018 to 2021 is 2.4 million yuan. Additionally, it funds the plum garden, which is of great significance to the campus. Pruning, fertilization, and pest control of trees and cypresses are carried out to maintain the health of the campus trees and for the sustainable development of ecology.

Note 1: Information source: Information on the "Carbon Reduction Forest Green Activity 99" website of the Forest Service Bureau, based on the carbon sequestration coefficient per unit area of forest land 7.45–14.9tonCO2e/ha/yr, the annual carbon absorption of Da'an Forest Park = 389 tons

Note 2: Source of information: Tree Bank, Environmental Protection Bureau, Pingtung County Government http://www.green99.com.tw/treebank/tree-6.html