

## **A REVIEW OF RESEARCH PROGRESS ON FOREST GROWTH AND YIELD MODELS**

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With the continuous deterioration of the world environment and the problems of resource transition and development, global environmental problems have become an important issue threatening to human development. The world should pay attention to the rational development and utilization of forest resources because the global forest resources are still being destroyed [1].

Accurately predicting the growth of trees and forests is an important basis for sustainable development of forest resources and the guarantee for sustainable human management. Studying the quantitative relationship between individual forest trees and the environment in the forest ecosystem is an important factor in determining the level of forest quality.

Before making a correct decision, it is necessary to grasp the stand structure, the dynamic change law, and predict the forest's response to the environment. This requires the establishment of a corresponding stand growth prediction model to improve work efficiency and make accurate assessments of stand growth forecasts [2].

Due to the multi-level nature of forestry management decisions and the different requirements of people for the use of models, many scholars have designed a wide variety of forest growth and yield models from different perspectives.

In the twentieth century ones researchers divided the growth and yield models into single tree models (based on the age of the forest, stand density, individual trees within the site or stand), into full forest models, diameter distribution model and single wood growth model.

However, the occurrence and development of forest ecosystems include transient growth processes and dynamic long-term processes. These models have different limitations in simulation accuracy, and the compatibility and overall consistency of the models have not been well resolved.

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With the development of modern science and technology, the introduction of advanced and practical modeling technologies in other disciplines, such as: modern model technologies such as process-based models, measurement error models [3], mixed effect models [4] and artificial neural network models [5], can be more prepared to estimate stand growth, more accurate prediction of forest dynamics, provides a theoretical basis for the development of sustainable forest development programs.

Future development directions of forest growth and yield models:

1) More extensive reliability data should be used to continuously improve the accuracy of models, and modern computer technology should be continuously used to develop intelligence, and improve the practicality of various models.

2) With the development of virtual technology, tools and means of introducing space-related factors are used to construct a three-dimensional visualization model, which simulates the natural growth of forests and the management process. A forest visualization model that considers both time and spatial will become a hot issue in research.

3) Due to the complexity of the growth environment of the mixed forest, the research on the growth laws and models of the mixed forest remains to be further studied.

4) At present, there are many types of models, and the applicable conditions are not the same. Most of the models are only built for a certain tree species in a certain area. Researchers should pay attention to finding a good correlation between different models.

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