

# Promoting forest landscape dynamic prediction: An online collaboration framework

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**Abstract:** Forest landscape dynamic prediction plays an important role in forest management, which can help forecast the future forest state at the landscape scale. However, as forest change issues become more comprehensive and complex, so do the challenges encountered by experts, particularly the challenge in the sharing and exchanging of knowledge and resources. Collaborative work is an effective method to deal with challenges, and it has been practiced to support forest studies through different types of collaborative modes. Multi-expert collaboration, as a typical collaborative mode, can assist in generating novel ideas for technologies, methodologies and designs to promote studies, but it remains limitations to support the entire process of forest landscape modeling that composes of different modeling tasks (e.g., data preparation, prediction scenario establishment, and process simulation). Therefore, we proposed an online collaboration framework to enable the collaborative forest landscape dynamic prediction. The framework contains four core modules for data preparation, model computation, prediction scenario configuration, and process organization. The data preparation and model computation modules are implemented based on the OpenGMS data service container and model service container respectively to help data sharing, data processing, and the service-based sharing of forest landscape models (FLMs); the prediction scenario configuration module can assist the collaborative forest landscape simulation with a set of WebSocket-based online tools; the process organization module can provide guidance for multi-expert collaboration with the visualized expression of forest landscape dynamic prediction processes. Based on the framework, a collaborative environment was developed, and the Landis-II model, a typical FLM, is selected in a case study to implement the forest aboveground biomass prediction and the decision-making for forest management. The results demonstrate that the online collaboration framework can effectively promote forest landscape dynamic prediction in data preparation, scenario configuration, and task arrangement.

**Keywords:** *Forest landscape modeling, Landis-II, web-based prediction, collaboration framework, OpenGMS*