Introduction
The production of woody biomass for industrial purposes and fuel wood for local inhabitants is considered to be the main marketed ecosystem service (ES) from Lithuanian forests, bringing the dominant share of income from forestry. Then there is a number of important non-market ES, such as recreation, carbon sequestration and the function of soil and water protection. It is obvious that multiple social, technological, economic, ecological and political factors affect the development of the forest industry, forests, and the ES provision. Thus, the holistic examination of ES provision calls for a transdisciplinary approach integrating the qualitative examination of external factors affecting forestry and quantitative modeling of forest development and ES flow, stipulated by certain behavior of forest owners.

This study explores methodological and applied aspects of linking qualitative methods of scenario planning with a decision support tool, via modeling the behavior of involved private forest owners (PFO) and state forest managers (SFM).

Methodological framework
The methodology is elaborated within the frames of the EU FP7 project INTEGRAL (Future-Orientated Integrated Management of European Forest Scenarios, www.integral-project.eu). It involves modeling the behavior of PFO & SFM under conditions of alternative future scenarios, setting the forest management programs (FMPs) and simulating the development of ES from forest landscapes.

Scenario development
The development of forest resources for 5 decades starting from 2013 is simulated for each scenario, using the Kupolis simulator (Petrauskas and Kulelišius 2004). Each FMP predefined an array of settings used to guide the simulation.

The behavior of forest owner/manager under conditions of specific scenario
To link qualitative scenarios and quantitative ES projections, each scenario predetermines the behavior of a forest owner who may: (i) migrate between the owner/manager types, and (ii) chose a certain forest management program throughout or on certain parts of estate depending on her/his forestry objectives.

Quantifying the ecosystem services
The following approaches were applied to quantify ES provision:
- Timber supply directly modelled in Kupolis.
- Carbon sequestration, recreational potential, diversity of tree species and the functions of soil and water protection modelled independently using the data on the status of forest resources available from Kupolis.

Scenario consequences on other identified ES were assessed by expert opinion and information developed during preceding steps of analysis.

Results
Future scenarios
Out of the multitude of possible trajectories through the scenario space the following 4 scenarios have been selected: Reforms and Economic Prosperity, “Green Lithuania”, Prosperous Timber Industry, and Business as Usual.

Elements and future manifestations:

Development of ES
The value of all ES in 2013 was normalized to 100%. All scenarios, except "Green Lithuania", were generating steadily increasing profits from timber, the trajectories of other ES were quite similar between scenarios. Management conditions under "Green Lithuania" resulted in relatively largest amounts of carbon stored in live trees and the lowest profits from timber production.

Discussion and conclusions
Lithuanian forest management planning is currently based on area control, largely disregarding contextual factors and views of other stakeholders. Simulating the development and use of forest resources usually involves constructing one or several management strategies utilizing the functionality of DSS and combining all forests irrespective of ownership type or a functional forest management zone. Here we use a novel approach, explicitly regarding alternative trajectories of social, technological, ecological and economic factors and also involving the local and practical knowledge. The basic idea is that the different qualitative scenarios simulate different management behavior of different forest owners and managers at landscape, forest enterprise or estate levels and choosing different FMPs that can be simulated in a computer environment. The integration of actors’ behavior into forest DSS provides a valuable linkage between the quantitative projections and qualitative scenario methods.

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