RISK ASSESSMENT APPROACH IN LATVIA'S FOREST MANAGEMENT

The forests cover 54% (3497 thou ha) of Latvia's territory and the amount of forest resources is growing steadily. Due to climatic and geographical conditions, the forest sector has been historically one of the pillars of Latvia's economy: the forest sector's contribution to Latvia's GDP is 7.5% and it employs 9% of the workforce of Latvia. A half of Latvian forests belongs to the private owners, therefore sustainability of private forests and economically effective management of them is significant for the development of the country's economy. At the same time, the preservation of ecological and social values of forests are connected with the use of adequate forest management planning methods.

The aim of the research is to develop decision making support system model and prototype of data processing programme in forest resources management with the purpose of achieving the goals defined by the policy of Latvia's forest sector as well as improving regulations of the forest sector.

The tasks of research are:

1. to investigate the geographical limitations of economic activities which are stipulated in the laws and regulations and which correspond to risk reduction (the area of the felling site, the width of the felling site, leaning, etc.) and development of algorithms for their automated identification and inclusion in forest management plan: such an approach will allow to avoid many mistakes which occur due to subjective factors, thus creating the opportunity to develop the decision making processes;

2. to investigate forest ecological and recreational planning methods, improve them and integrate them in the support system of decision making of forest management planning;

3. to create wood resources inventory and forest management planning mobile data management and decision making support tools.

METHODOLOGY

A process model of sustainable forest growth has been developed, basing on new scientific research which will result in the information on forestry risks, and it is adapted to the local conditions of global climate changes. It should be determined to what extent and how the climate changes promote the productivity of forest (forest growth and necrosis), invasion of southern species and the spread of pests and diseases alien to Latvia's conditions, response to biological diversity and intensifying of anthropogenic impact, which, overall, make it necessary to critically review and, possibly, modify the existing technologies of forest management (growing, regeneration, tending, utilization, conservation and protection). The existing experience in Latvia and in the world will be summarized up on the innovative technologies of forest resources inventory and data collection as well as the creation of prototypes of data bases, algorithms and computer programmes for ensuring decision making support systems for sustainable management of forest resources.

DISCUSSION AND RESULTS

The developed data processing programmes ensure more rational utilization of forest resources and creating of products with higher added value in sustainable way. The wood resources inventory system and the corresponding data processing programme improve the traceability of wood resources and more rational planning of the transport flow. With the implementation of research results, the production costs of timber products are decreased.
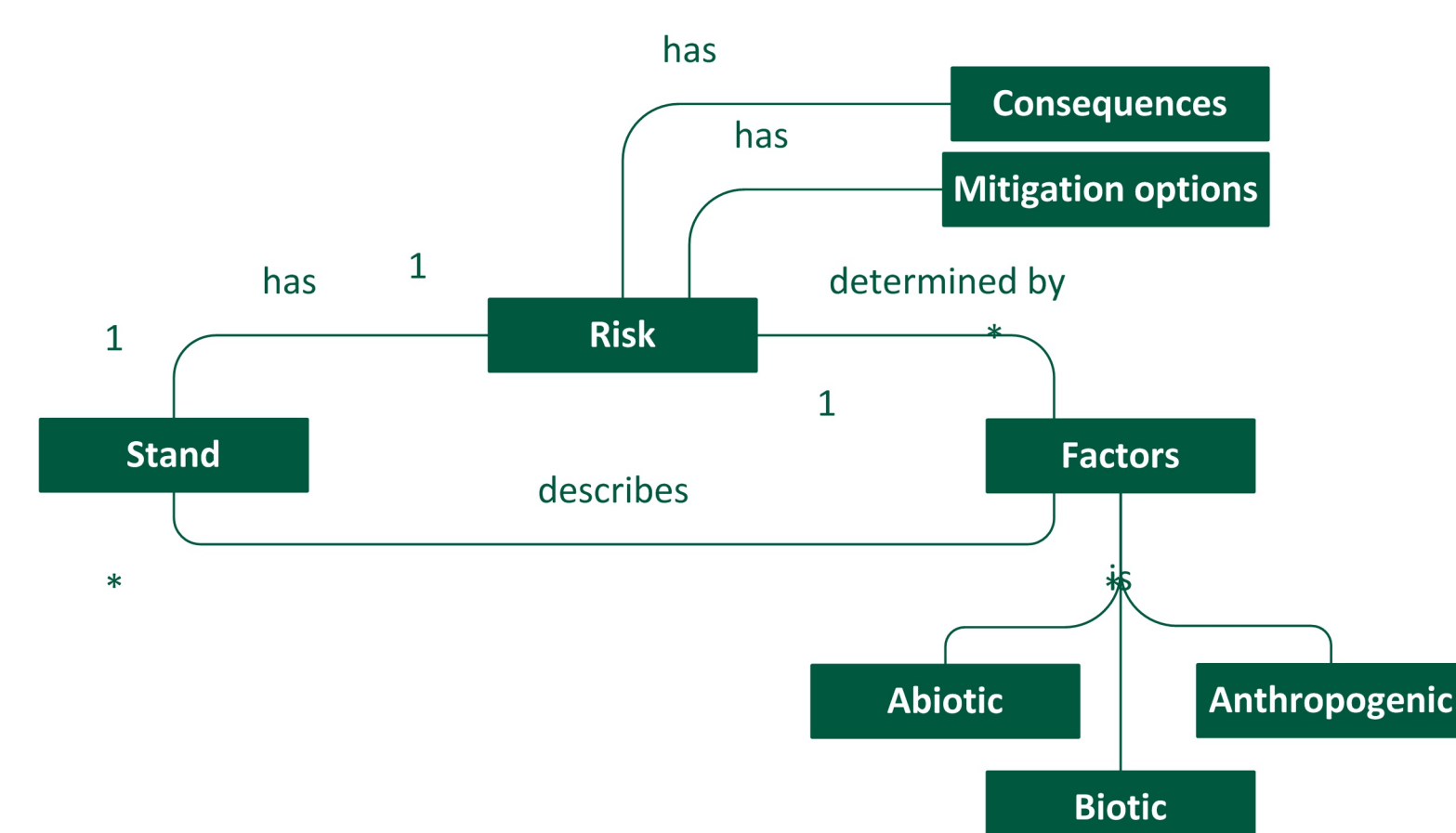

Fig 1. Concepts of risk assessment system

There is a possibility to calculate the production costs more accurately, resulting in prerequisites for developing new types of products. The development of forest spatial planning methods creates a possibility to plan the output of forest resources in a more rational way, corresponding to social and ecological forest functions, which decrease the harm done to the environment. Introducing technology innovations in forest management planning the forestry activities are planned in a more rational way, which results in the increase in labour productivity and a decrease in labour costs.

1. Stating of the fact of the impact of global climate changes on the productivity of forest stands.
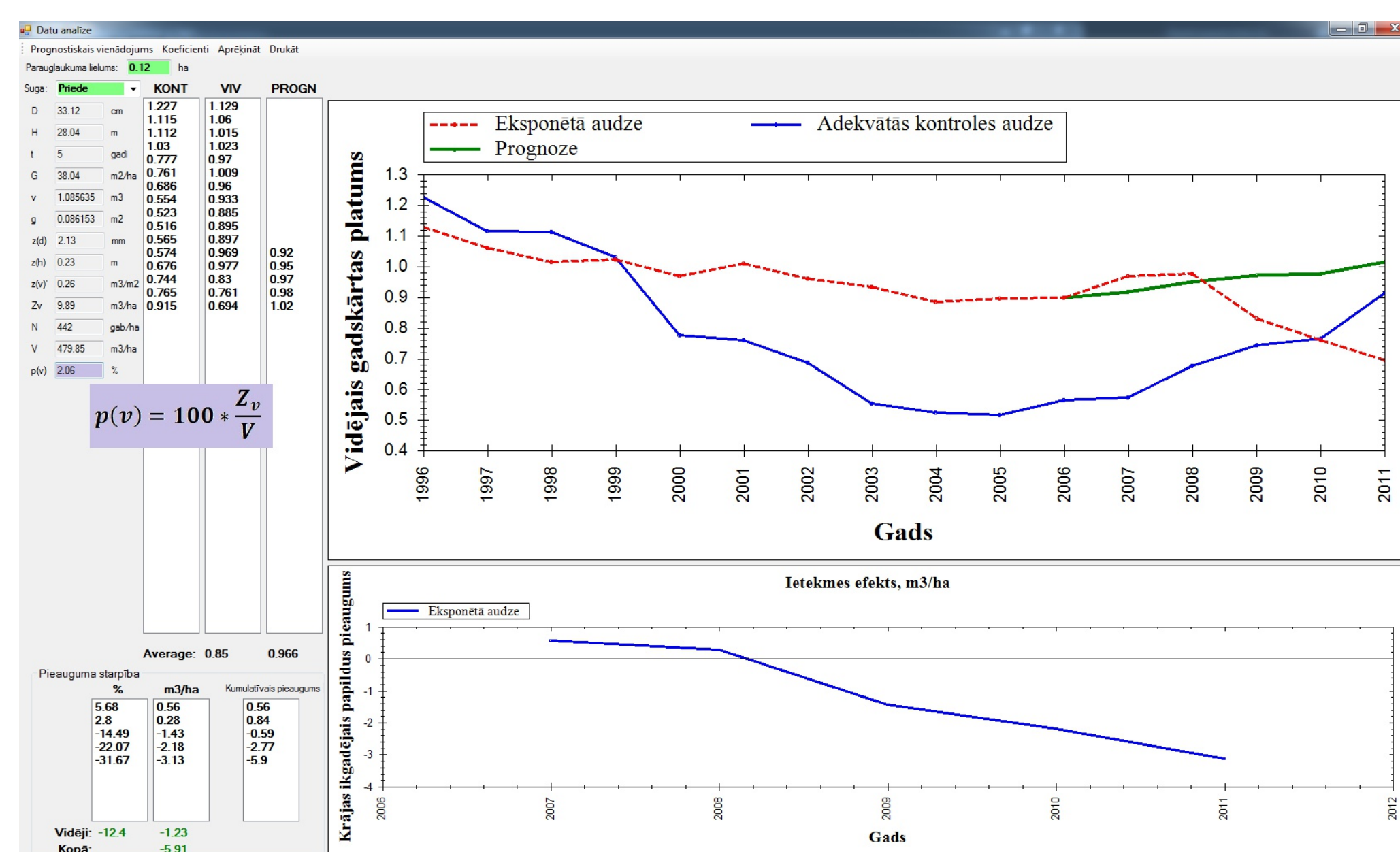

Fig. 2. The analysis of increment based on risk impact

The situation concerning the forest increment in Latvia and elsewhere is contradictory: the difference in the interpretation of the concept of increment in standing volume, which considerably limits its practical use for acquiring wood resources and in the dynamics control; labour intensity in the methods of determination or insufficient accuracy; lack of data about natural die-back; lack of methodology to determine the amount of unregistered wood and lack of data on that. Therefore it is necessary to develop chamber type calculation method for calculating the increment in standing volume which should be applied both at a regional and national level, which does not require collection of specific data, but uses the materials from the forest inventory data.

2. To clarify the anthropogenic influence on the biological diversity of forest in woodland key habitats and in the locations of concentration of woodland key habitats (WKH).
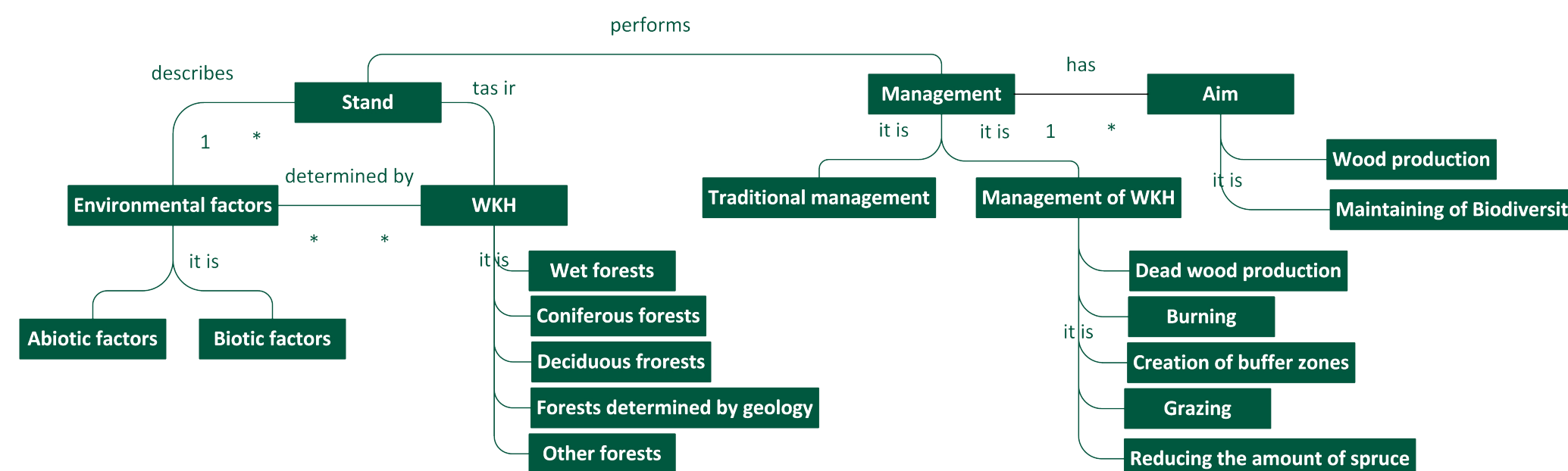

Fig 3. The conformity of WKH

Acquiring and researching the data on biological diversity of the forest is cumbersome due to the difficulties of quantitative description; the lack of knowledge about the dependence of biological diversity on the climatic, edaphic and phytocenotic factors of the stand; the difference of anthropogenic impact; natural diversity in woodland key habitats and in the places where they concentrate.

3. Analysis of the health condition of young stands.

The rapid changes in climate, environmental pollution and anthropogenic impacts bring about the worsening of the forests sanitary condition for the neutralization of which critical evaluation and modification of forest management techniques are required with the purpose of preserving the productivity of the forests and their economic contribution to the economy. Under the conditions of a changing environment, the young stands are particularly threatened. Therefore, the risk factors of forest management will be identified and possible solutions will be researched to eliminate them in order to increase the productivity of forests. Methodology will be prepared for more effective determination of instructions for carrying out economic activities in forestry.
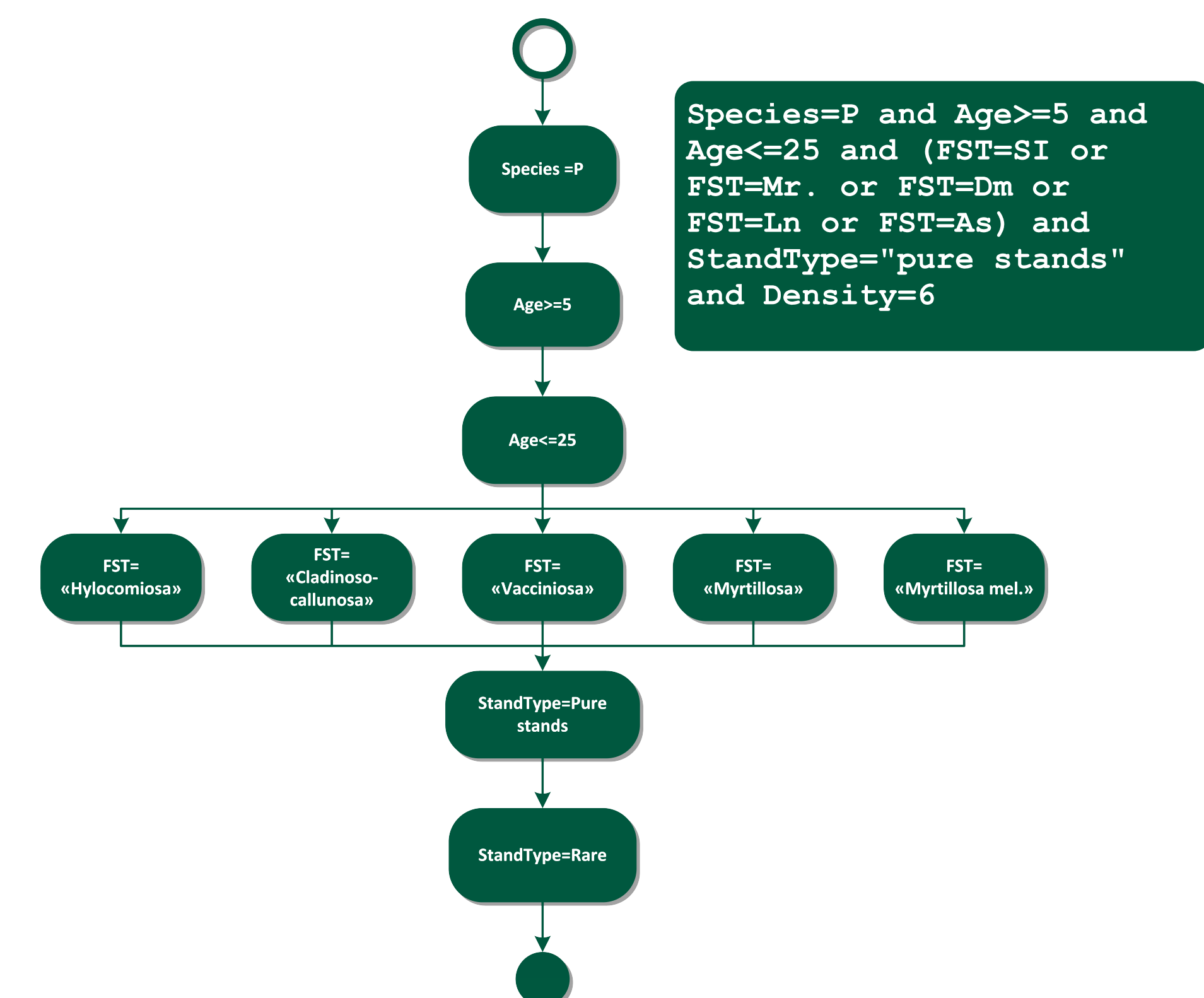

Fig 4. Risk scenario

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