OrgBalt
LIFE project

Simulation tool – opportunity to develop knowledge-based policy

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EU LIFE Programme project
"Demonstration of climate change mitigation potential of nutrients rich organic soils in Baltic States and Finland"

LIFE OrgBalt, LIFE18 CCM/LV/001158

Life
State Regional Development Agency Republic of Latvia
SILAVA
Ministry of Agriculture Republic of Latvia
Latvia University of Life Sciences and Technologies
University of Tartu
Luke Natural Resources Institute Finland
Lithuanian Research Centre for Agriculture and Forestry
Baltijas krasti
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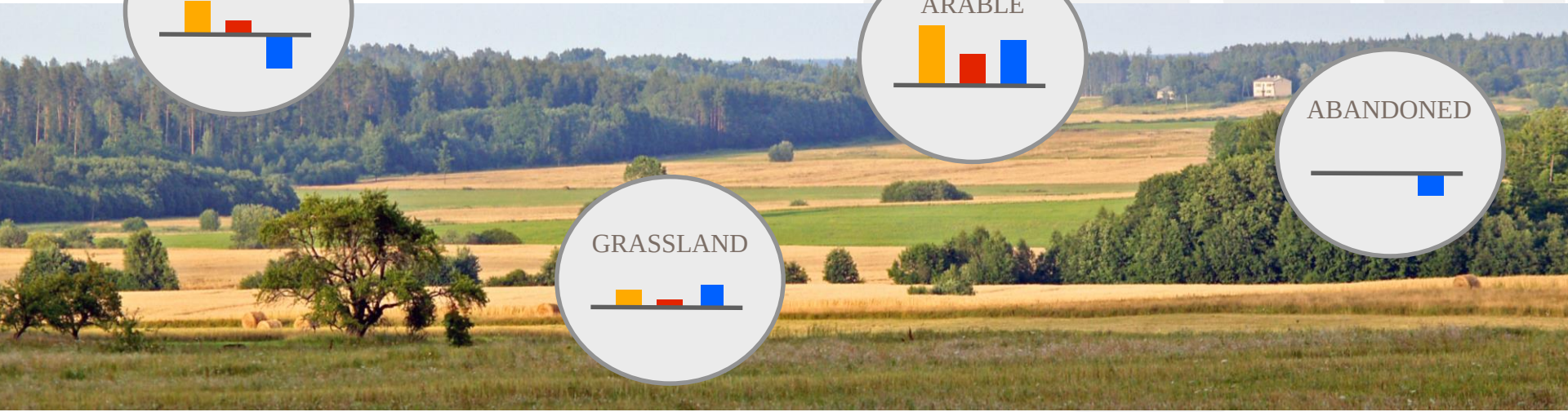
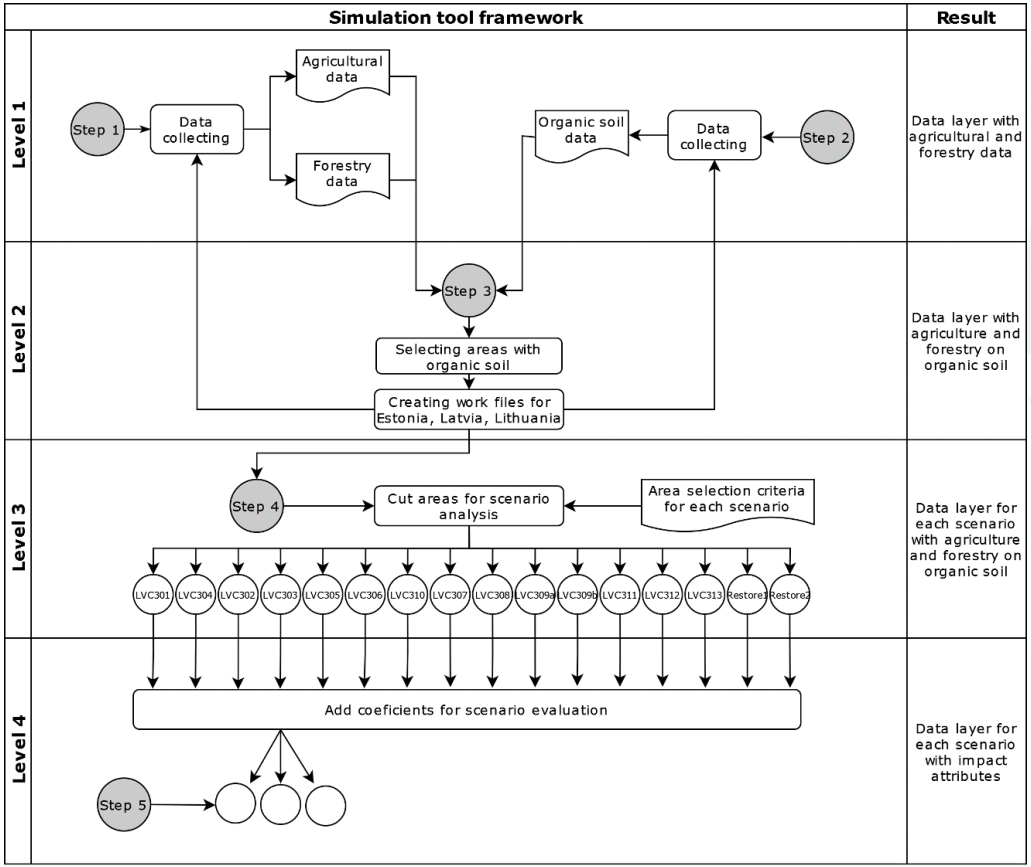

FOREST
ARABLE
ABANDONED
GRASSLAND

SCENARIO ANALYSIS

SIMULATION TOOL

- Simulation tool is data-based tool for policy planning and decision making at regional and national level.
- It evaluates the impact of climate change mitigation measures on socio-economic indicators and GHG emission reduction at national level for three Baltic States.
- Results of Simulation tool also shows possible spatial location of the GHG emission reduction measures.



Step 1: to collect agricultural and forestry data for the creation of a detailed land use data layer for each polygon.

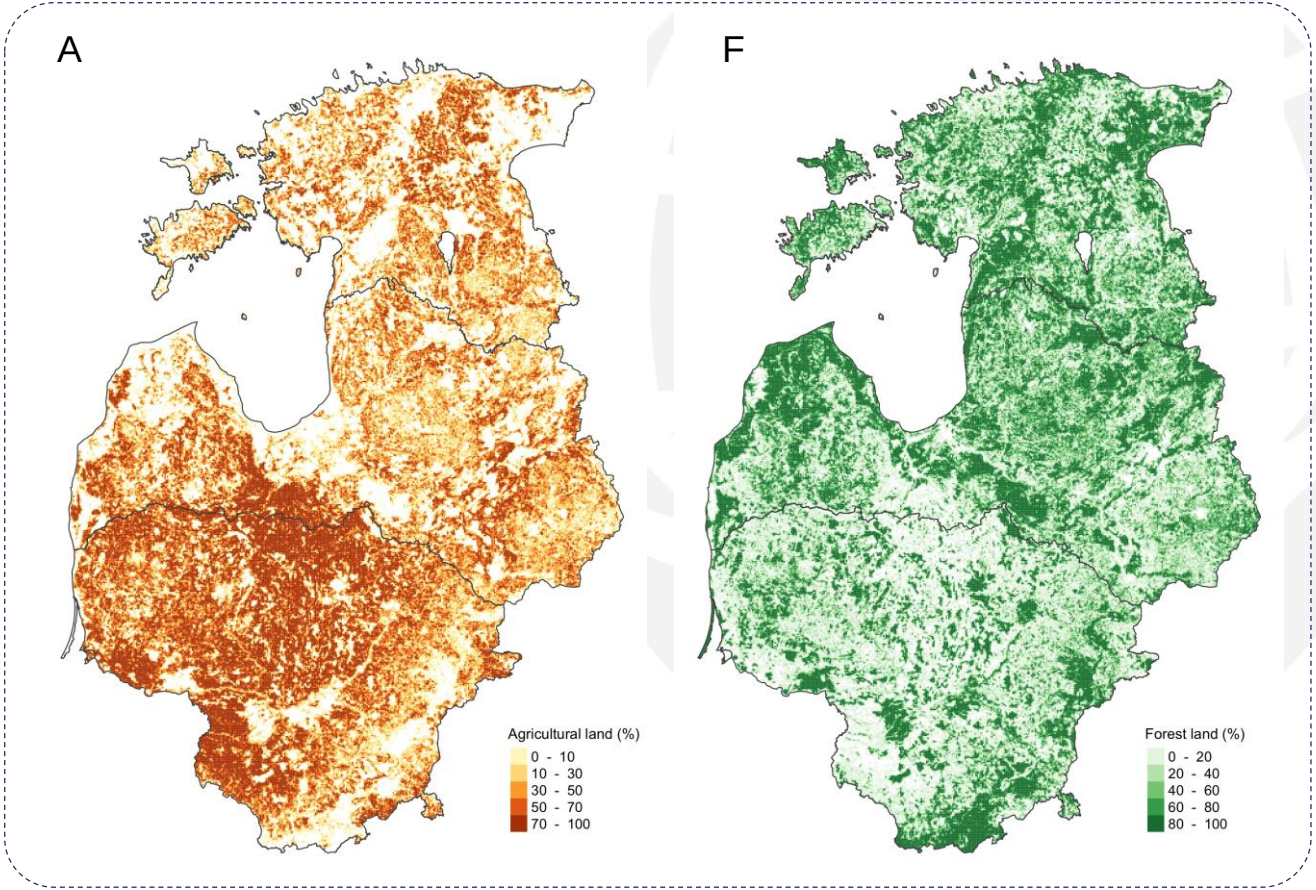
Step 2: to collect data for organic soil.

Step 3: to generate working files for three Baltic States including only those agricultural and forestry areas located on organic soil

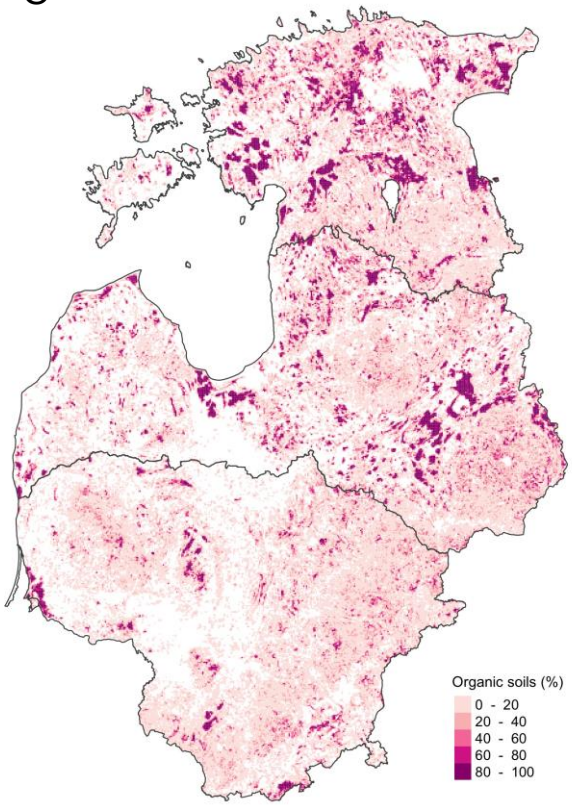
Step 4: to cut area from generated working files for each scenario based on predefined area selection criteria.

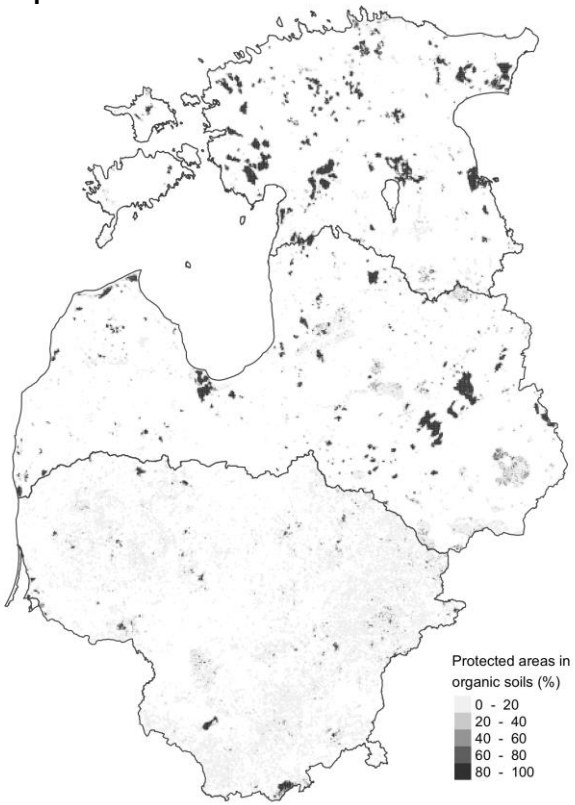
Step 5: impact assessment on profit, employment, and GHG emissions after implementation of scenarios.

Agricultural and forest land areas …



… are overlapped with organic land areas and protected areas

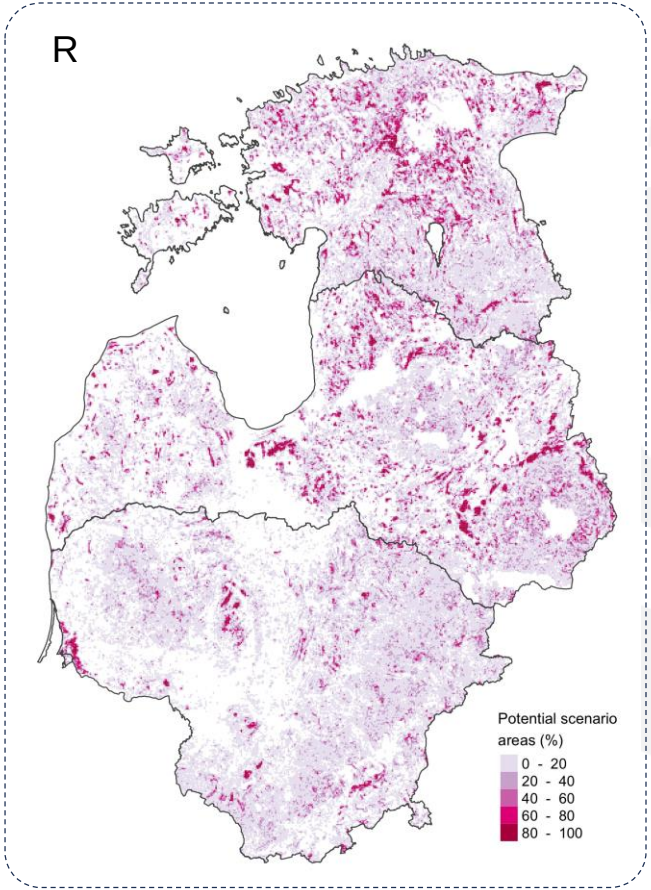




For organic soils is used data from "Paludiculture in the Baltic states" project financed by the European Climate Initiative (EUKI)

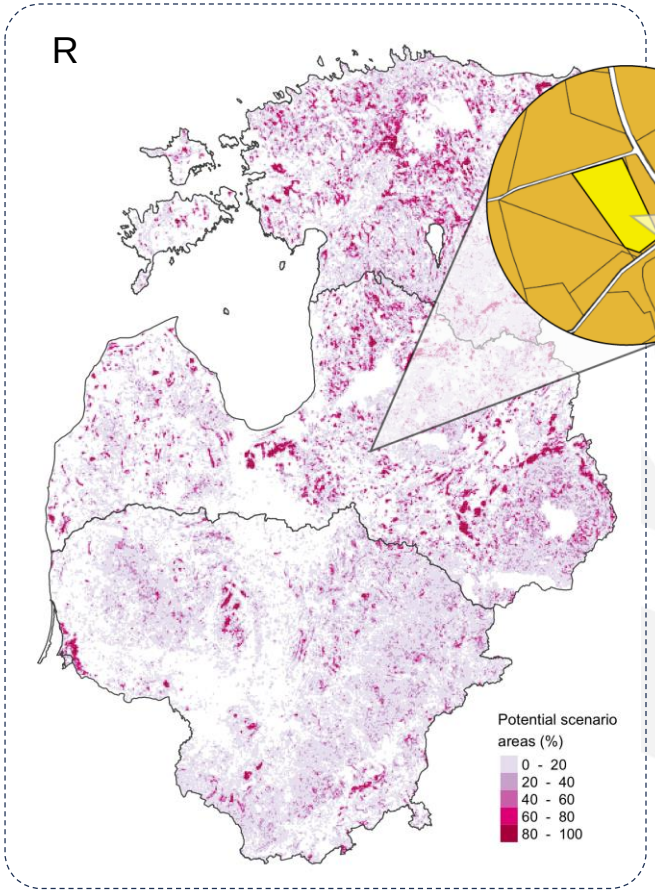
THE RESULT:
Agricultural and forest land layer on organic soils, except protected areas

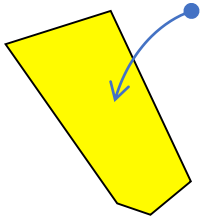
$$R = (A + F) \cap (C - P)$$



THE RESULT:
Agricultural and forest land layer on organic soils, except protected areas

$$R = (A + F) \cap (C - P)$$





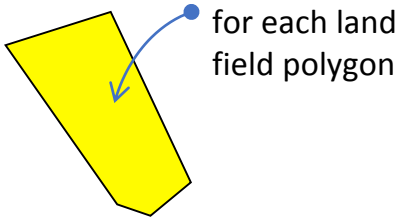
Calculations for each land field polygon

	BEFORE	AFTER	DIFFERENCE
Net GHG emissions (CO_2 eq)			OrgBalt
Profit (eur)	algorithms	algorithms	
Employment (hours)	algorithms	algorithms	

Evaluation for 2030

Evaluation for 2050

For organic soils is used data from "Paludiculture in the Baltic states" project financed by the European Climate Initiative (EUKI)



	BEFORE	AFTER	DIFFERENCE
Net GHG emissions (CO_2 eq)			OrgBalt
Profit (eur)	algorithms	algorithms	
Employment (hours)	algorithms	algorithms	

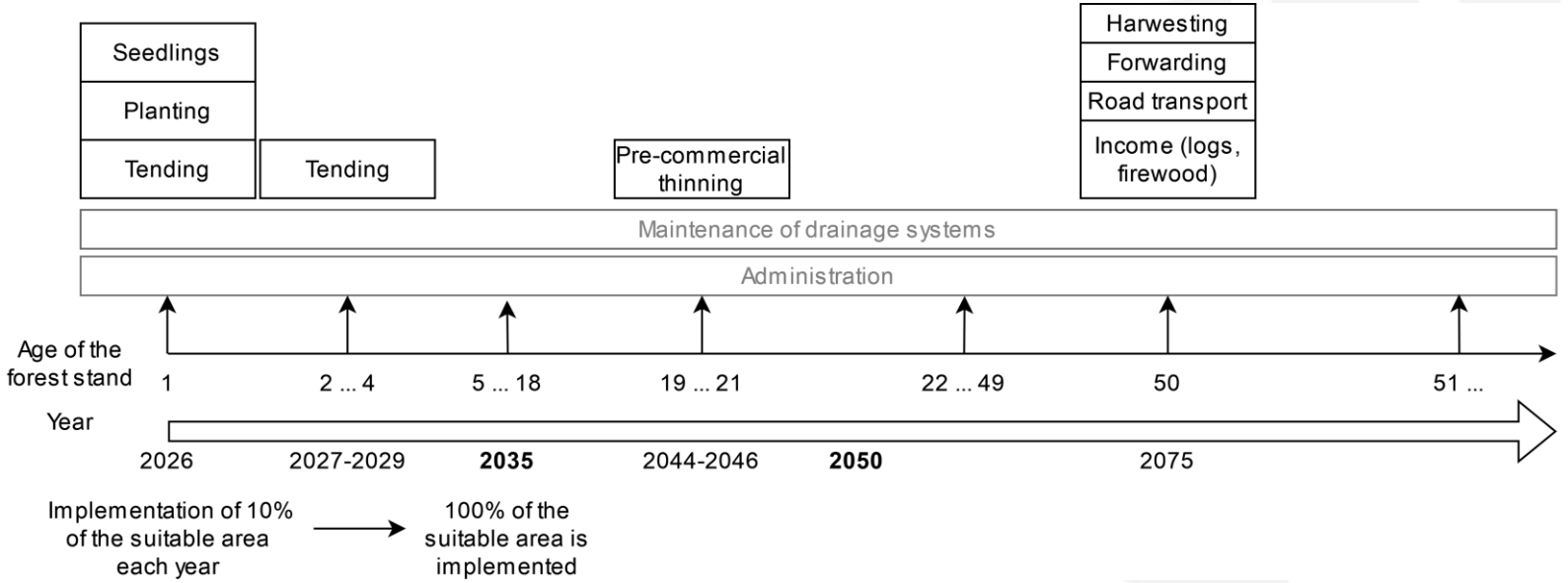
	Labor input (h/ha)			
	Large farms	Medium farms	Small farms	Mikro farms
Grains, oilseeds, pulses	15	18	24	32
Potatoes	72	165	223	315
Vegetables, strawberries, flowers	284	370	545	585
Perennial plantations	380	450	550	550
Other crops	90	115	160	225
Fallow land	6	7	12	22
Grasslands	16	19	25	34
Meadows and pastures	6	8	11	23

Evaluation for 2030

Evaluation for 2050

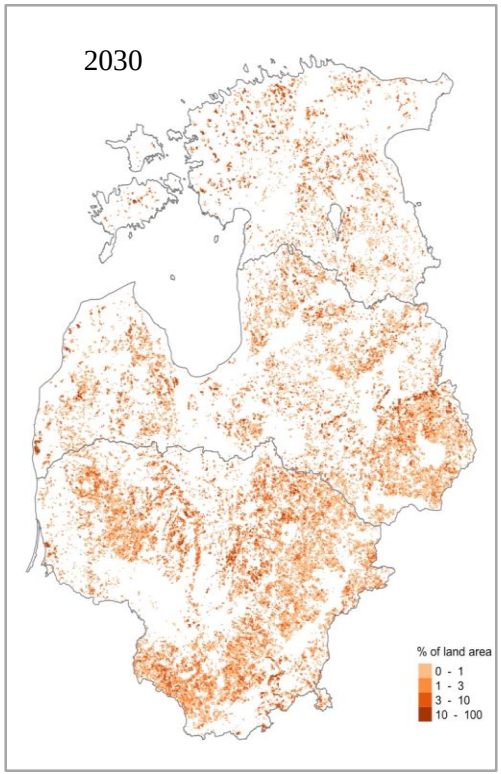
For organic soils is used data from "Paludiculture in the Baltic states" project financed by the European Climate Initiative (EUKI)

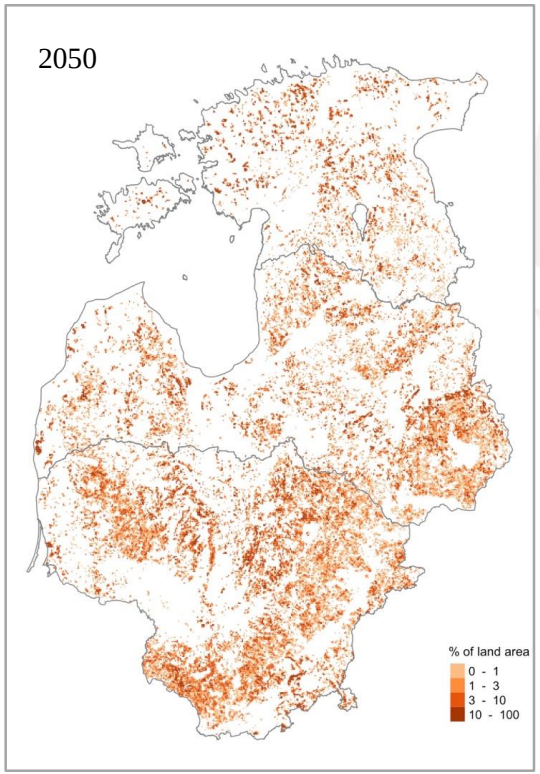
FOREST LAND



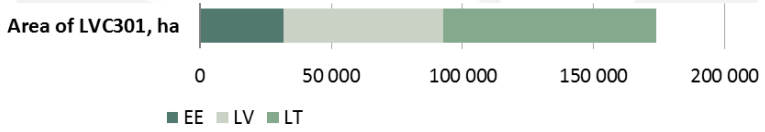
For organic soils is used data from "Paludiculture in the Baltic states" project financed by the European Climate Initiative (EUKI)

LVC301: CONVERSION OF CROPLAND TO GRASSLAND

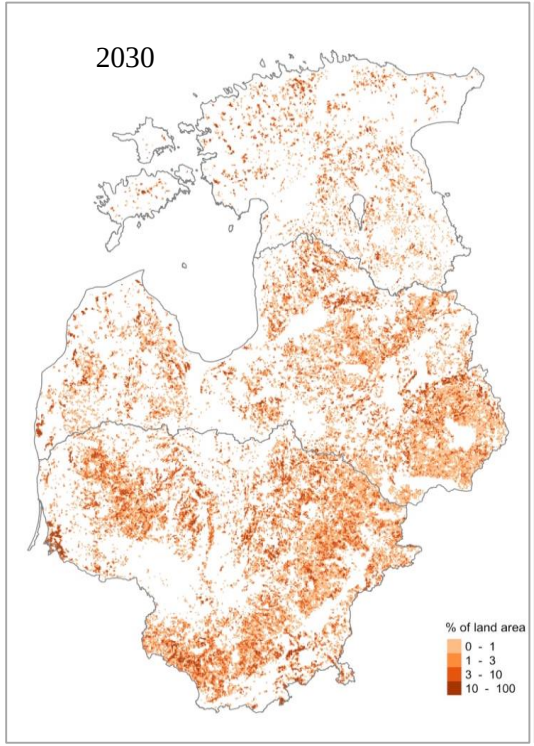


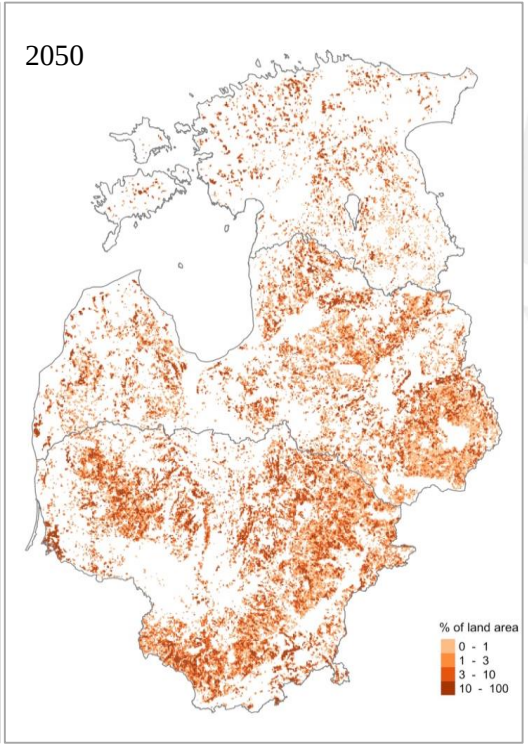


Description	Area selection criteria	Land use after implementation
Cropland with nutrient-rich organic soil conversion to grassland. Increased carbon stock in soil and below-ground biomass, reduced risks of nutrient leaching and soil erosion.	Organic soil, arable land without perennial plantations	Grassland

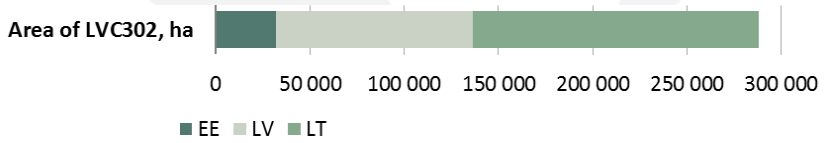


LVC302: CONVENTIONAL AFFORESTATION (SPRUCE)

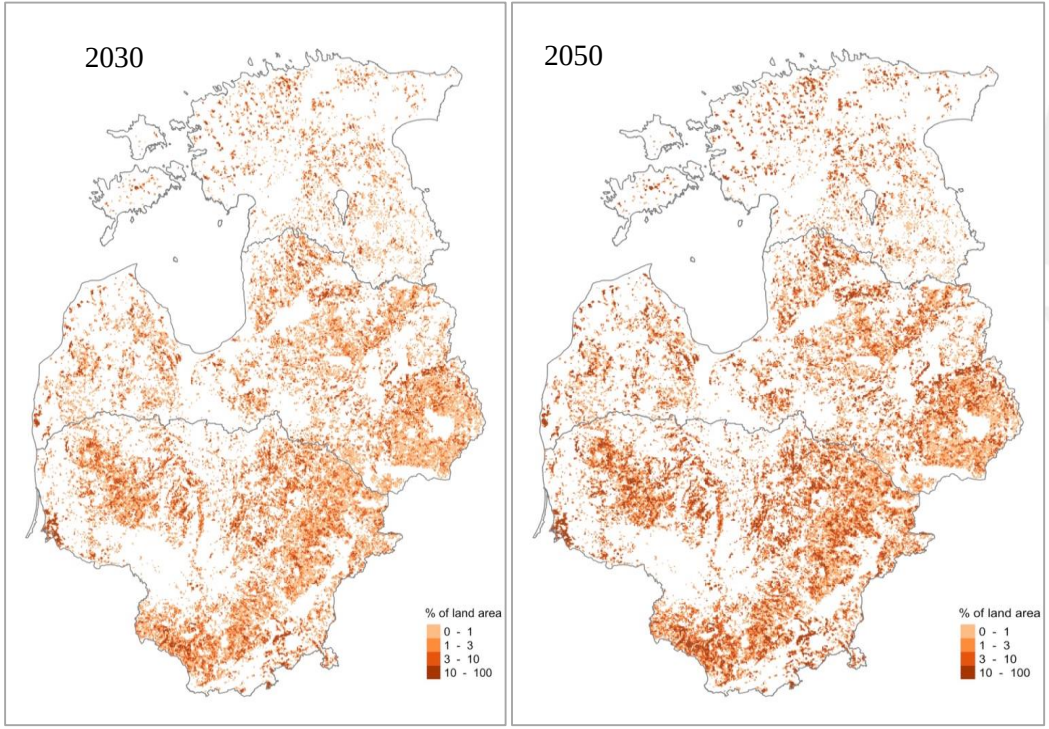




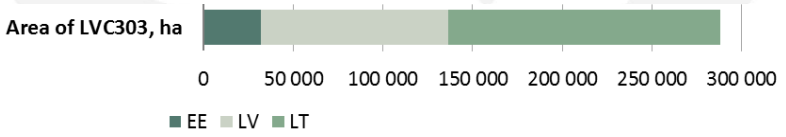
Description	Area selection criteria	Land use after implementation
Demonstration of the reduction of GHG emissions from area previously used as pasture or perennial grassland for fodder production by afforestation with spruce. Reduced GHG emissions from soil. Accumulation of CO_2 in living and dead biomass, soil and litter and replacement effect of forest biofuel and harvested wood products. Shorter rotation and more intensified management ensures higher yield and replacement effect, as well as reduces carbon losses due to root rot and other disturbances.	Organic soil, grassland, perennial grassland, arable land without perennial plantations	Forest stand with spruce



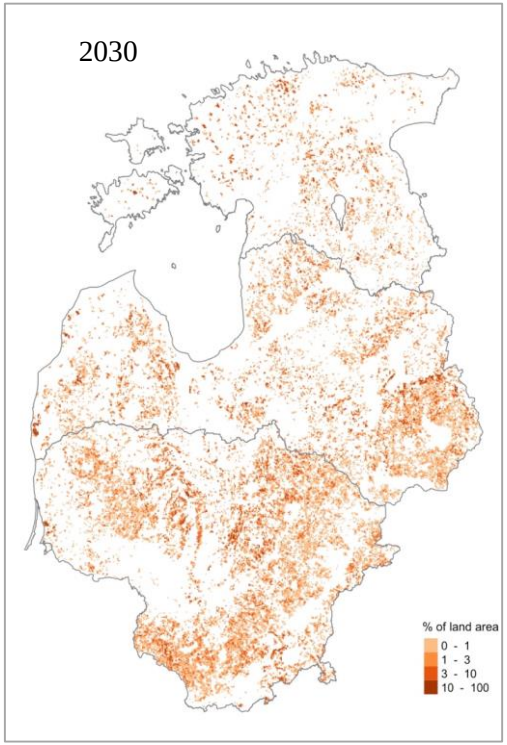
LVC303: INTRODUCTION OF FOREST PALUDICULTURE (DECIDIOUS TREES)

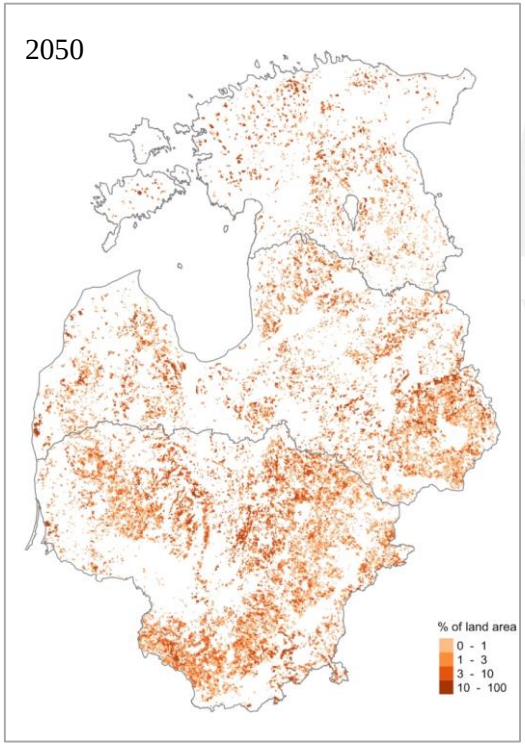


Description	Area selection criteria	Land use after implementation
Reduction of GHG emissions by establishing forest paludiculture (dominant species - black alder and birch) in grassland with nutrient-rich organic soil and increased groundwater level.	Organic soil, grassland, perennial grassland, arable land without perennial plantations	Forest stand with black alder and birch

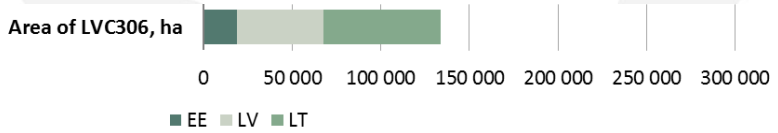


LVC306: AGROFORESTRY – FAST GROWING TREES AND GRASS

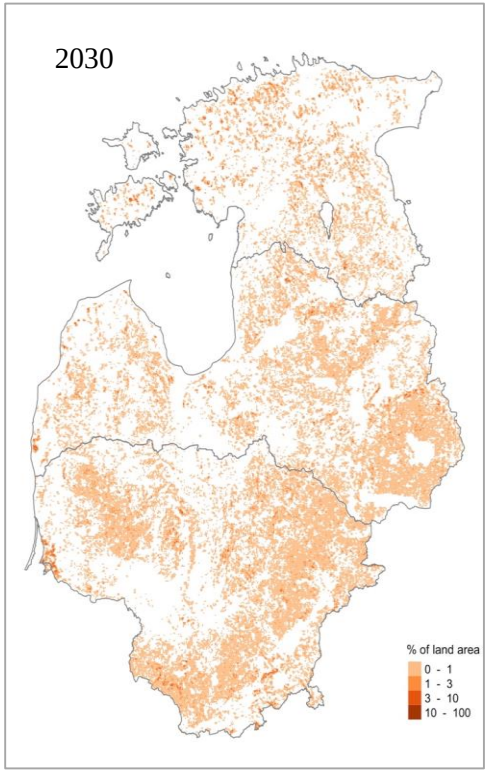


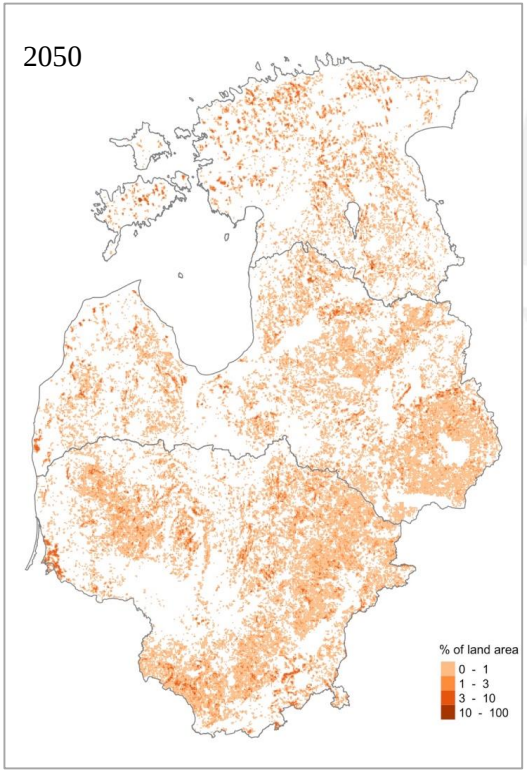


Description	Area selection criteria	Land use after implementation
GHG emissions reduction through transformation of cropland to tree plantation. Projected reduction of GHG emissions is related to the decrease of N_2O and CO_2 emissions from soil as well as to the increase of CO_2 removals in living biomass and other carbon pools.	Organic soil, arable land without perennial grassland and perennial plantations	Forest stand with poplar

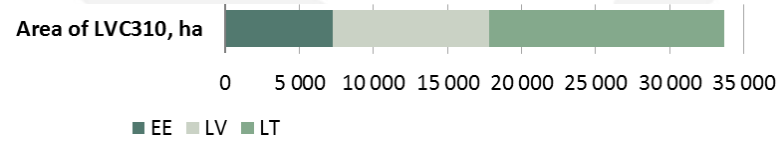


LVC310: FAST GROWING SPECIES IN RIPARIAN BUFFER ZONES

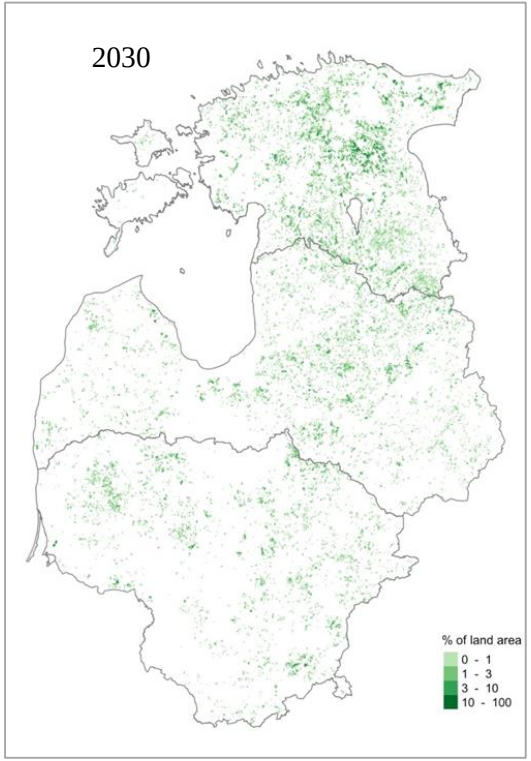


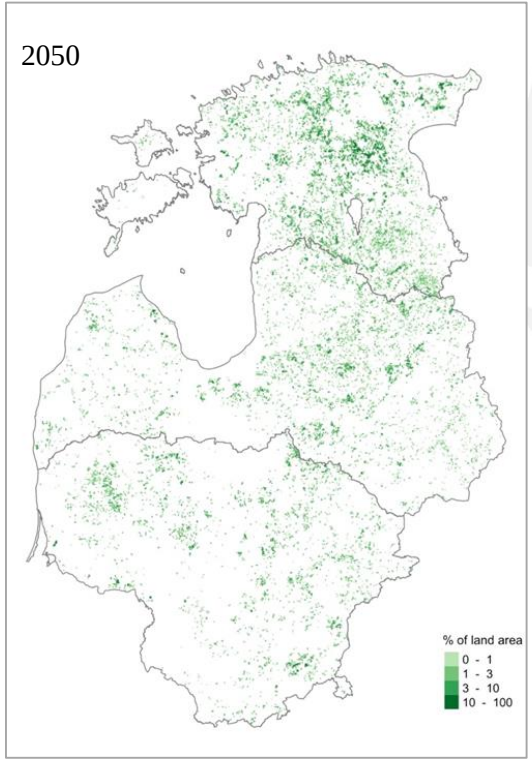


Description	Area selection criteria	Land use after implementation
GHG emissions reduction through transformation of strip areas along drainage diches in cropland to tree plantation areas that avoid nutrient leaching and increase carbon removals in living biomass and other carbon pools. Projected reduction of GHG emissions is related to the decrease of N_2O and CO_2 emissions from soil as well as to the increase of CO_2 removals in living biomass and other carbon pools.	Organic soil, agricultural land, buffer zone at least 9.5 m wide from the edge of the ditch	Forest plantation with poplar and willow

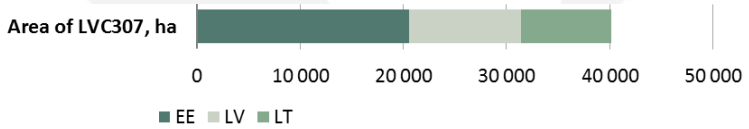


LVC307: APPLICATION OF WOOD ASH IN SPRUCE TREE STANDS

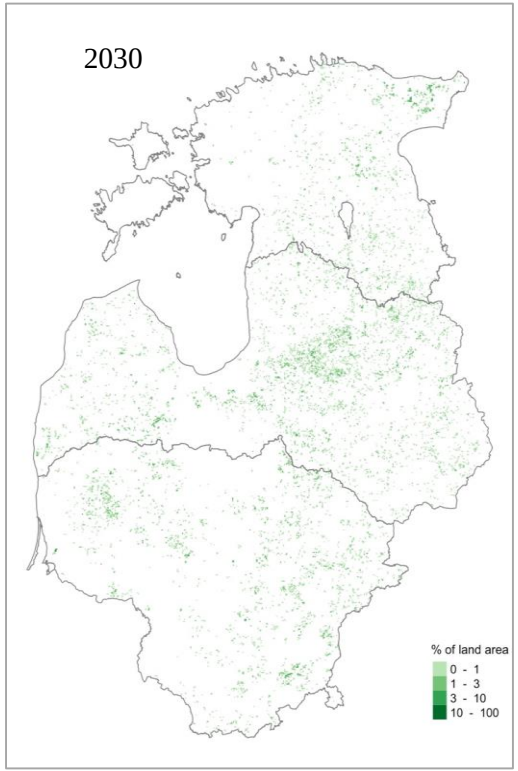


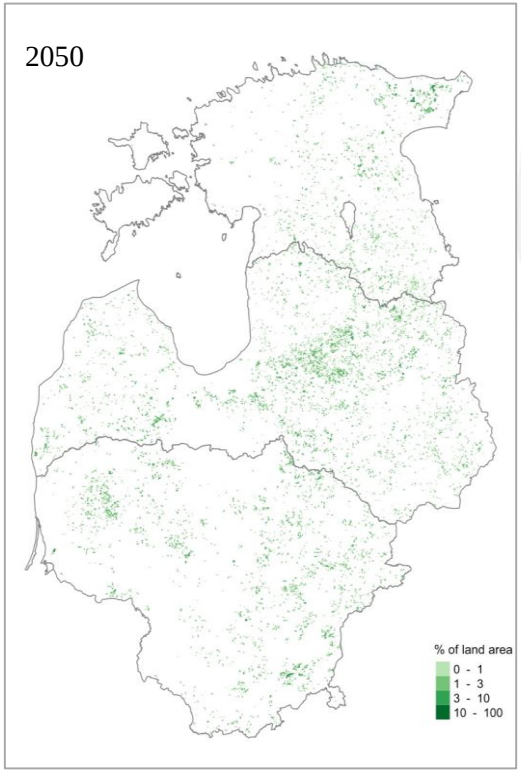


Description	Area selection criteria	Land use after implementation
GHG emissions reduction in spruce stands on organic soils and lowered ground water table by implementation of wood ash after thinning thus enhancing stand growing conditions. Projected reduction of GHG emissions is related to groundwater level reduction, related to increase in growing stock increment and increased water amount used for transpiration processes – thus decreasing CH_4 emissions and increasing CO_2 removals in living biomass.	Organic soil, forest stand classification Kv, Km, Ks, Kp, II-IV site index, spruce at least 50%, age at least 20 years	Forest stand with spruce

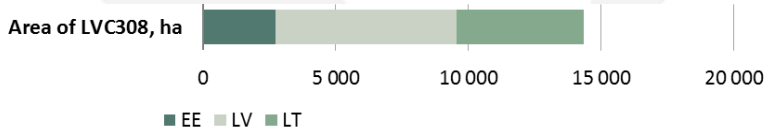


LVC308: CONTINUOUS FOREST IN SPRUCE STAND

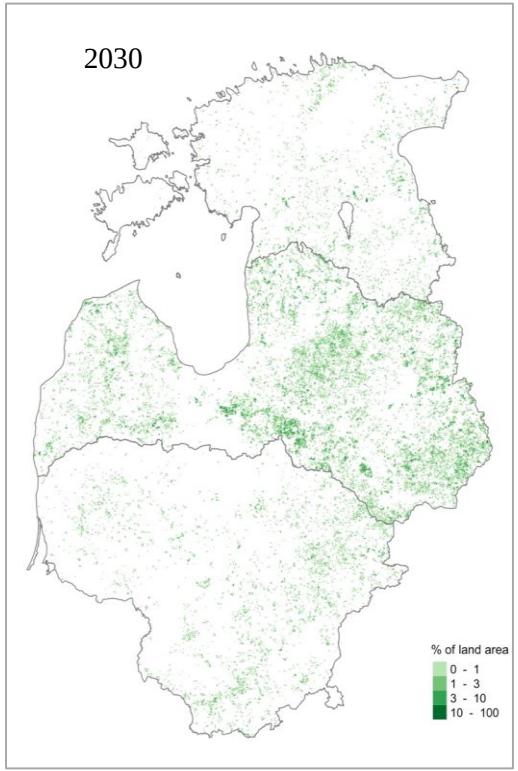


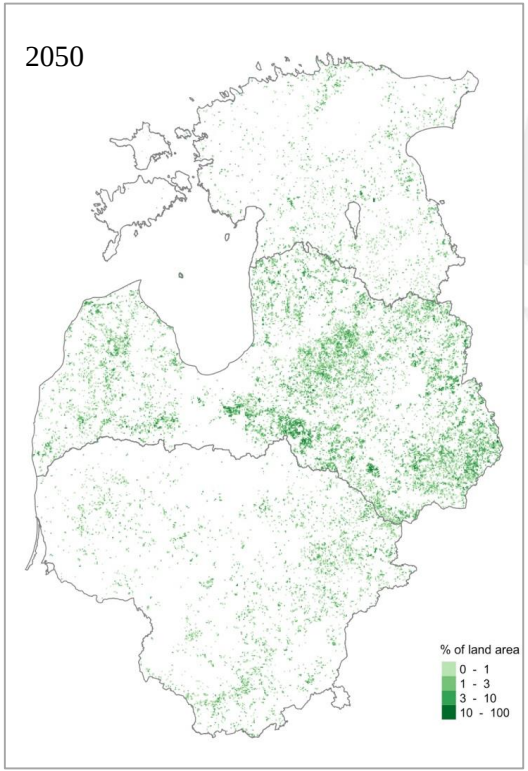


Description	Area selection criteria	Land use after implementation
GHG emissions reduction in spruce stand by replacing clear felling with selective felling. Projected reduction of GHG emissions is related to the increase of groundwater level in an alternative – clear felling scenario. Increase of groundwater level is associated with significant increase of CH_4. In the case of selective felling increase of groundwater levels should be smaller thus also increase of GHG emissions is smaller.	Organic soil, forest stand classification Pv, Nd, Db, Lk, Kv, Km, Ks, Kp, main specie spruce, age 81 years	Forest stand with spruce

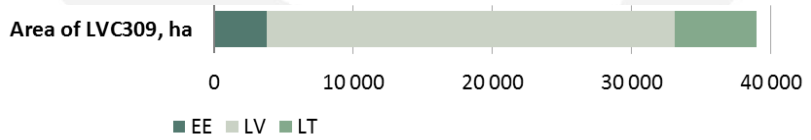


LVC309: FOREST REGENERATION WITH BLACK ALDER AND BIRCH IN NON-DRAINED ORGANIC SOIL

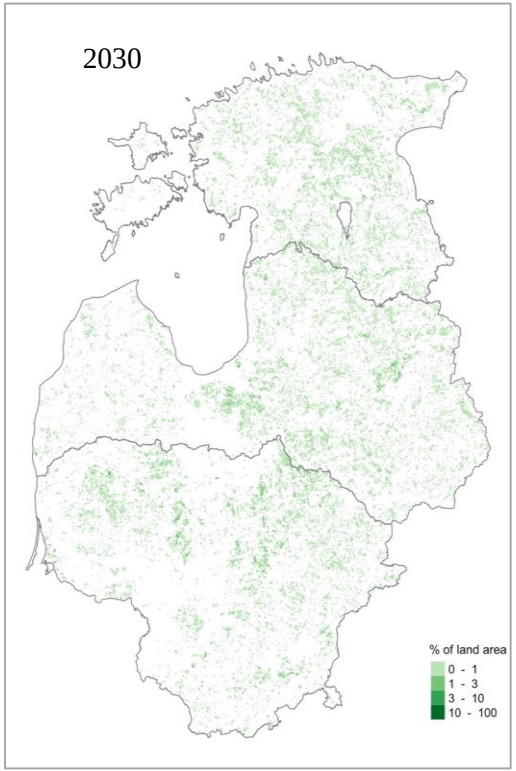


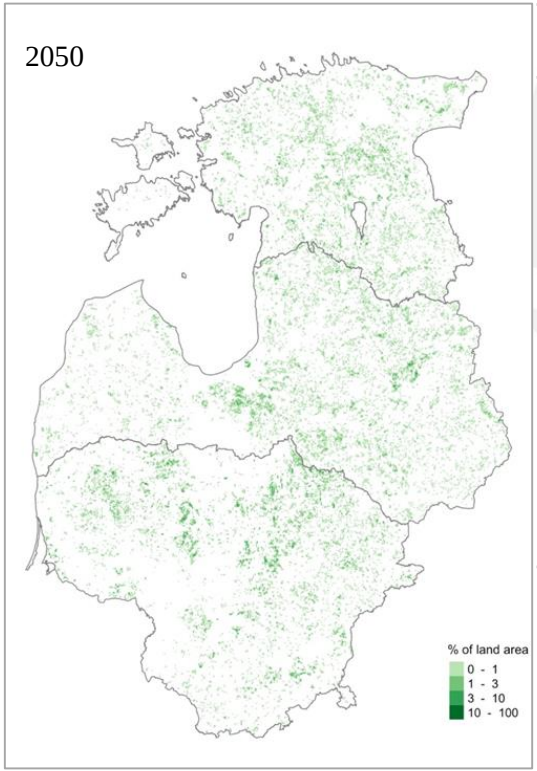


Description	Area selection criteria	Land use after implementation
GHG emissions reduction in black alder and birch stand by using genetically selected planting material and improving hydrological regime. Projected reduction of GHG emissions is related to groundwater level stabilizing during forest regeneration phase and better growth conditions and increased CO_2 removals in forest biomass and other carbon stocks.	Organic soil, forest stand classification Pv, Nd, Db, Lk, main specie black alder, birch, age 71 years, I-III site index	Forest stand with black alder and birch

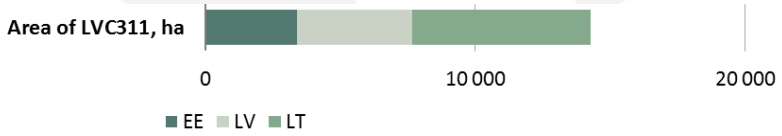


LVC311: RIPARIAN BUFFER ZONE IN FOREST LAND PLANTED WITH BLACK ALDER

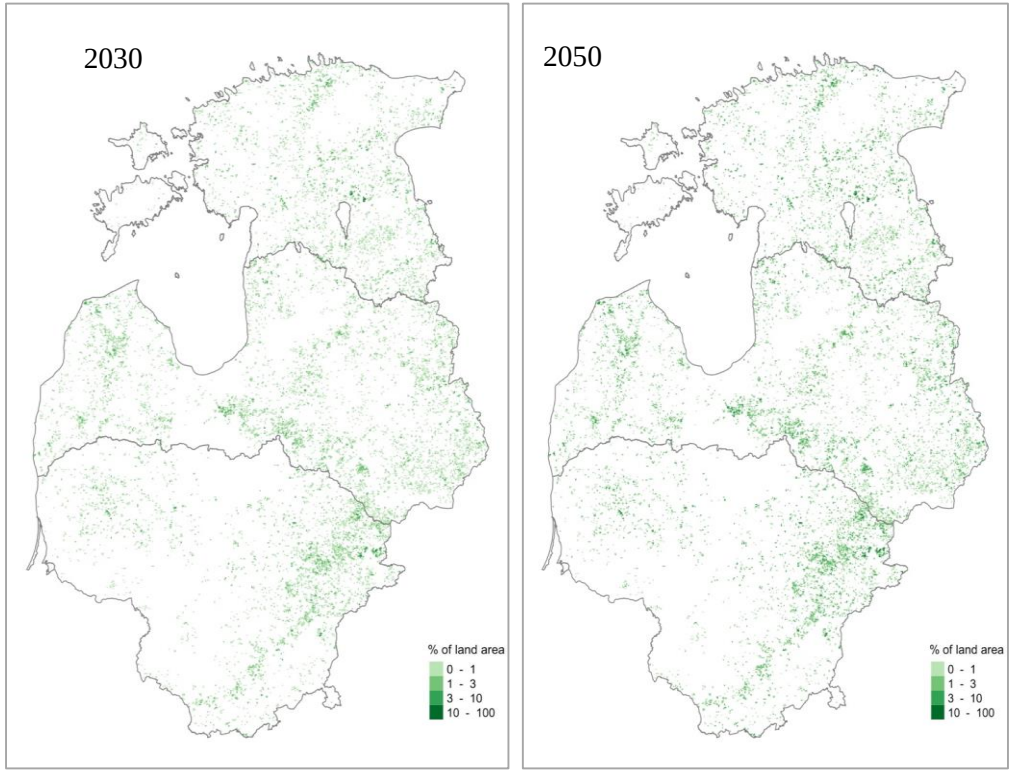




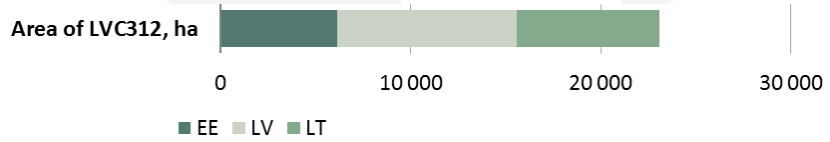
Description	Area selection criteria	Land use after implementation
GHG emissions reduction in deciduous tree stands on organic soils with increased ground water table by enhancing tree growing conditions, using high quality planting material and preparing soil with mounding method including establishing of deep furrows for excess surface water drainage in spring time and after rainfalls. Projected reduction of GHG emissions is related to groundwater level reduction, related to establishment of deep furrows - as a result decreasing CH_4 emissions and increasing CO_2 removals in living biomass.	Organic soil, forest stand classification Ks, Kp, buffer zones of reclamation systems in forest lands	Forest stand with black alder



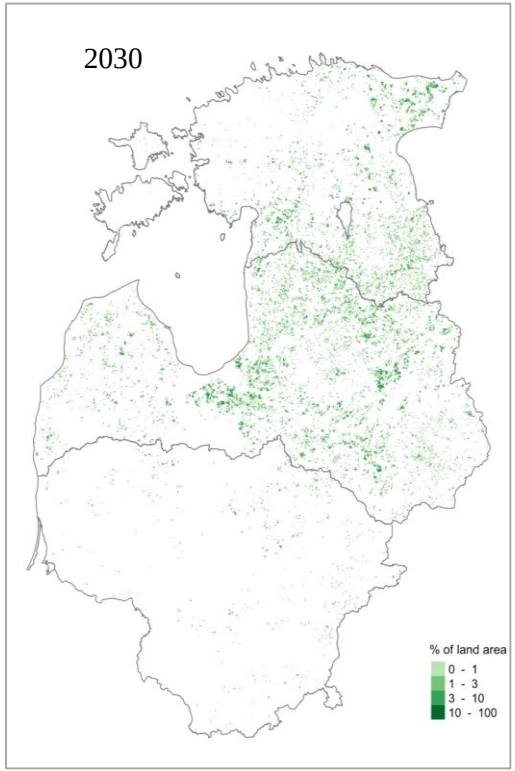
LVC312: FOREST REGENERATION WITH PINE IN NON-DRAINED ORGANIC SOIL

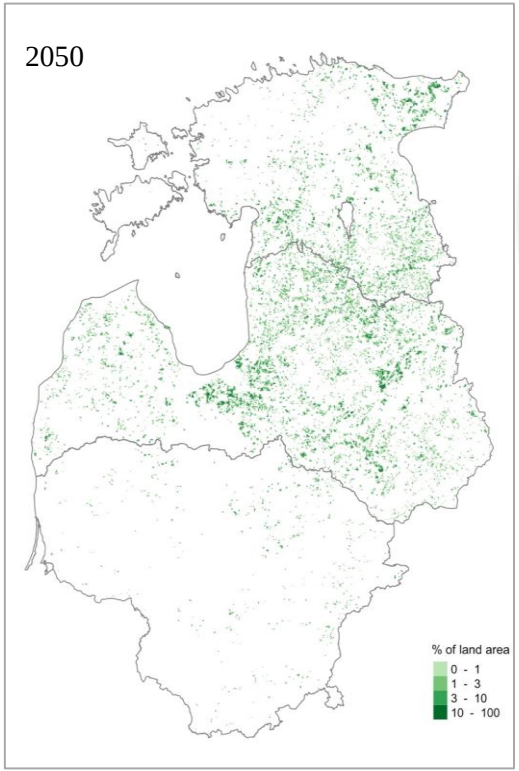


Description	Area selection criteria	Land use after implementation
GHG emissions reduction in coniferous stands on organic soils and increased ground water table by application of forest regeneration with high quality coniferous planting material and by using mounding method for soil preparation. Projected reduction of GHG emissions is related to groundwater level reduction, related to establishment of deep furrows - as a result decreasing CH_4 emissions and increasing CO_2 removals in living biomass because of enhanced forest growing conditions.	Organic soil, forest stand classification Pv, Nd, Db, main species birch (age 71, II-V site index), aspen (age 41, site index II-V), black alder (age 71, II-V tosite index),	Forest stand with pine

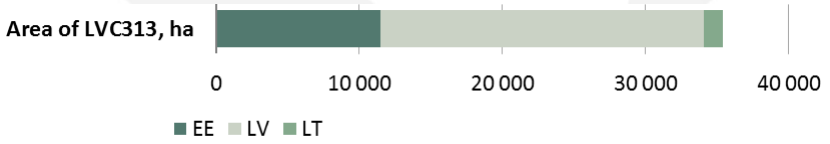


LVC313: STRIP HARVESTING IN PINE STAND

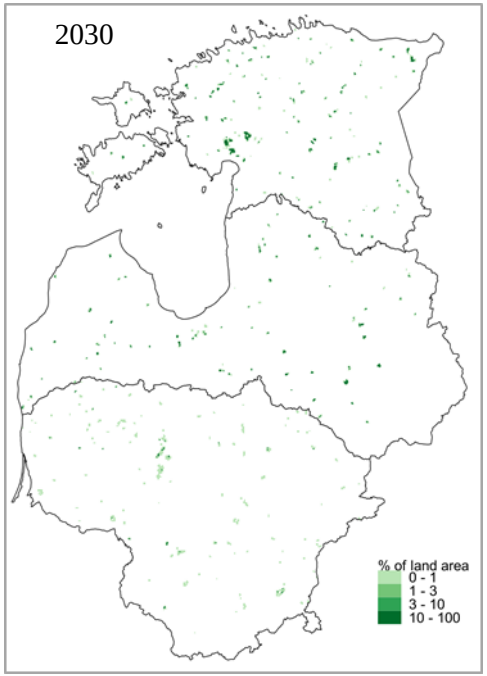


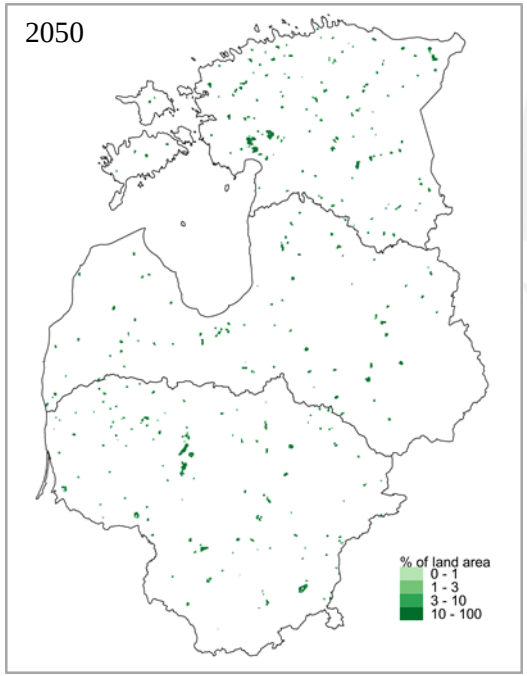


Description	Area selection criteria	Land use after implementation
GHG emissions reduction in pine stand by replacing clear felling with strip harvesting. Projected reduction of GHG emissions is related to the increase of groundwater level in alternative – clear felling scenario. Increase of groundwater level is associated with significant increase of CH_4. In the case of strip harvesting increase of groundwater levels should be smaller thus also increase of GHG emissions is smaller.	Organic soil, forest stand classification Kv, Km, Ks, Kp, main specie pine, age 101 years, I-III site index	Forest stand with pine

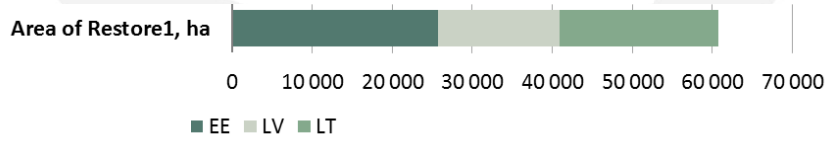


RESTORE1: GROWING BLUEBERRIES IN WETLANDS

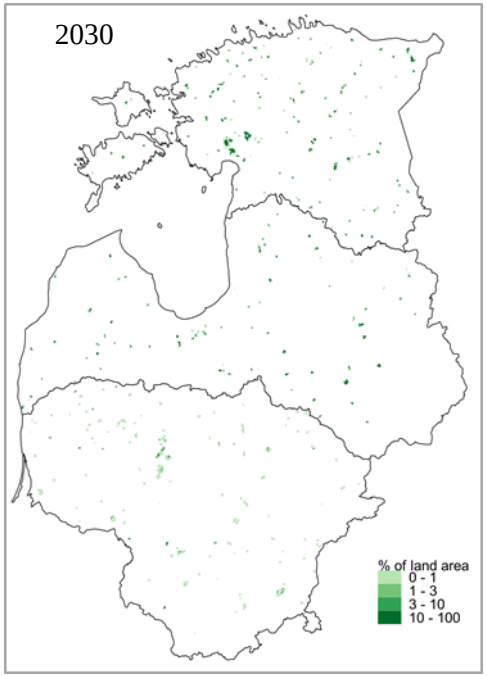


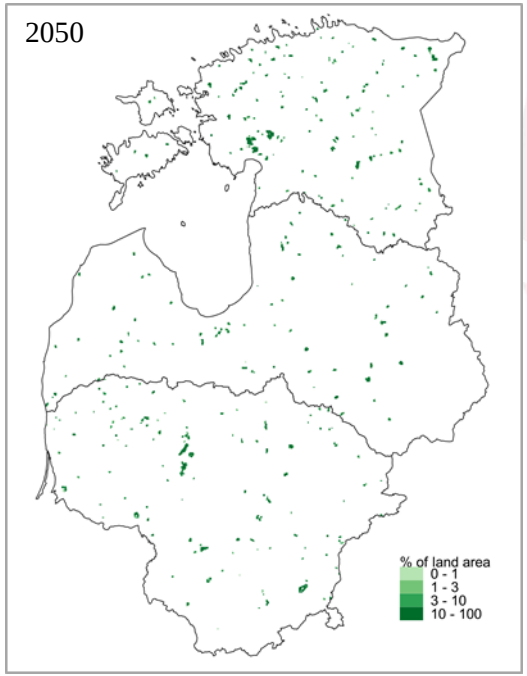


Description	Area selection criteria	Land use after implementation
Conversion of former peat extraction sites to agricultural land where tall highbush blueberry *Vaccinium corymbosum*, or lowbush blueberry *Vaccinium angustifolium* are grown.	Former peat extraction field	Perennial plantation peat

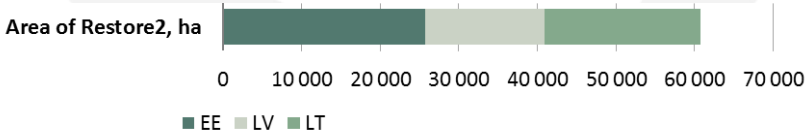


RESTORE2: GROWING CRANBERRIES IN WETLANDS

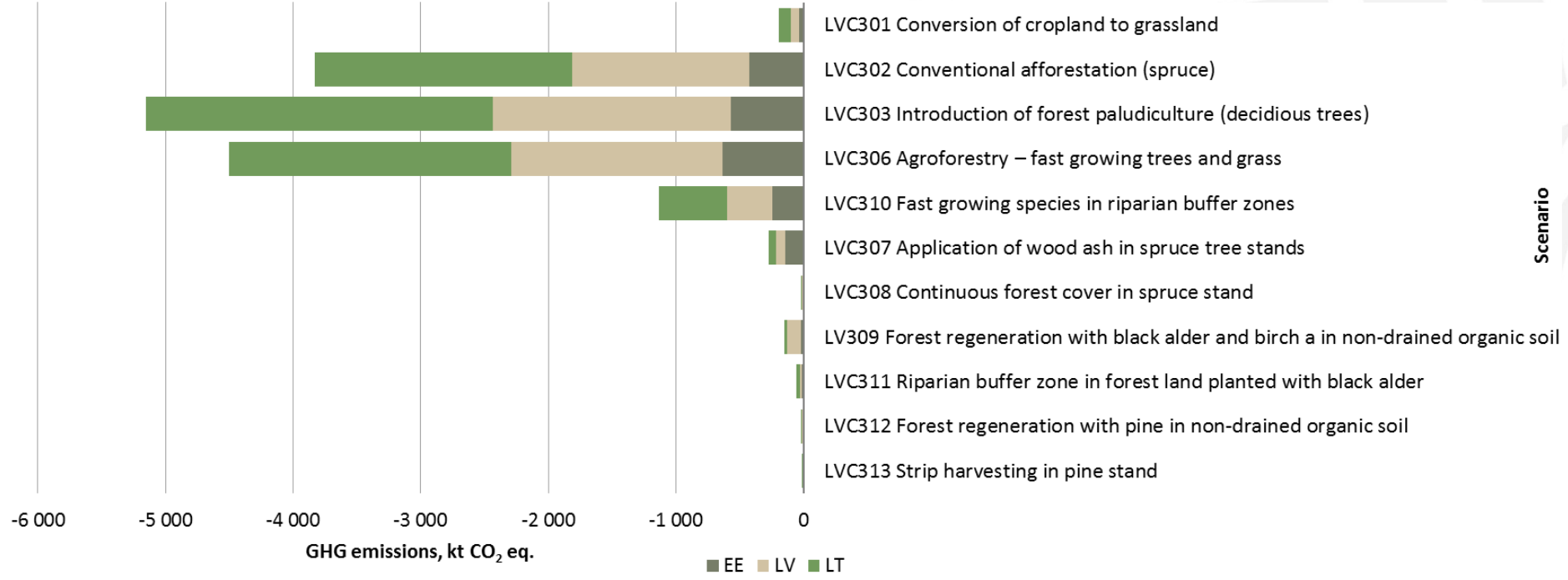




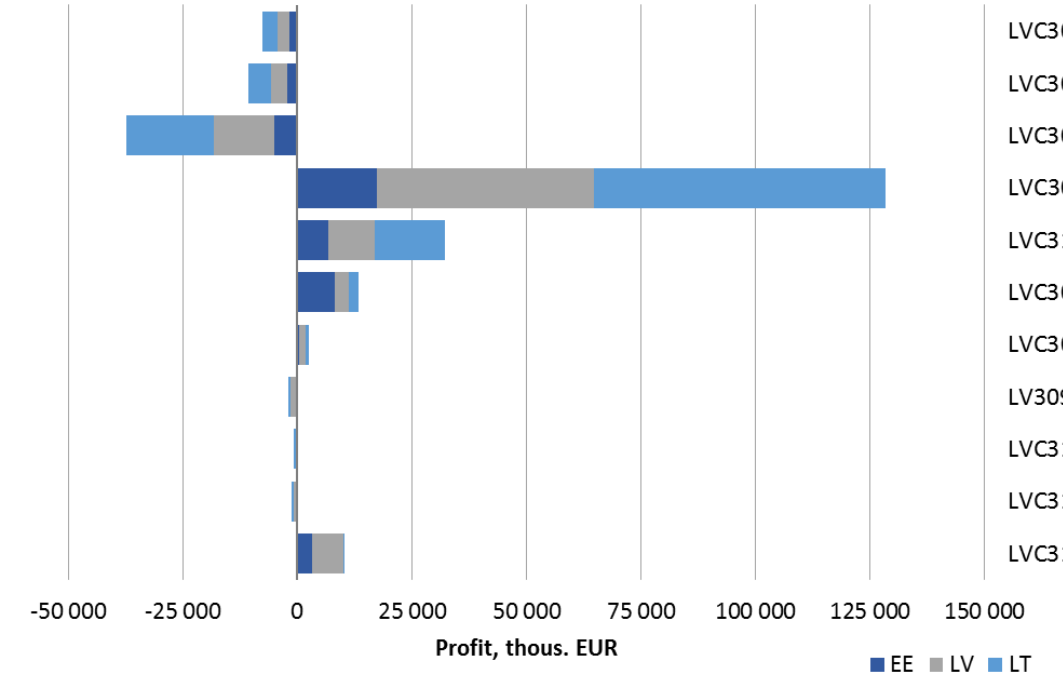
Description	Area selection criteria	Land use after implementation
Conversion of former peat extraction sites to agricultural land where large cranberry *Vaccinium macrocarpon* is grown.	Former peat extraction field	Perennial plantation



IMPACT ON GHG EMISSIONS IN 2050



IMPACT ON PROFITS IN 2050



Scenario

LVC301 Conversion of cropland to grassland

LVC302 Conventional afforestation (spruce)

LVC303 Introduction of forest paludiculture (decidious trees)

LVC306 Agroforestry – fast growing trees and grass

LVC310 Fast growing species in riparian buffer zones

LVC307 Application of wood ash in spruce tree stands

LVC308 Continuous forest cover in spruce stand

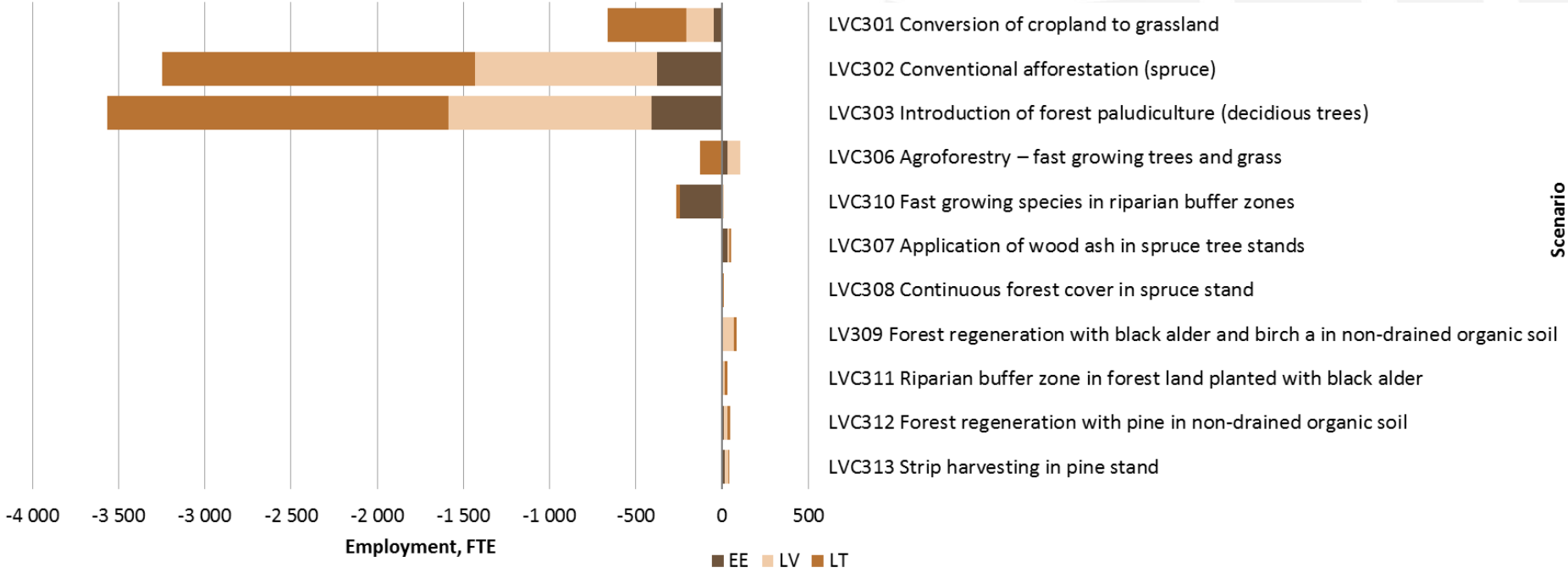
LV309 Forest regeneration with black alder and birch a in non-drained organic soil

LVC311 Riparian buffer zone in forest land planted with black alder

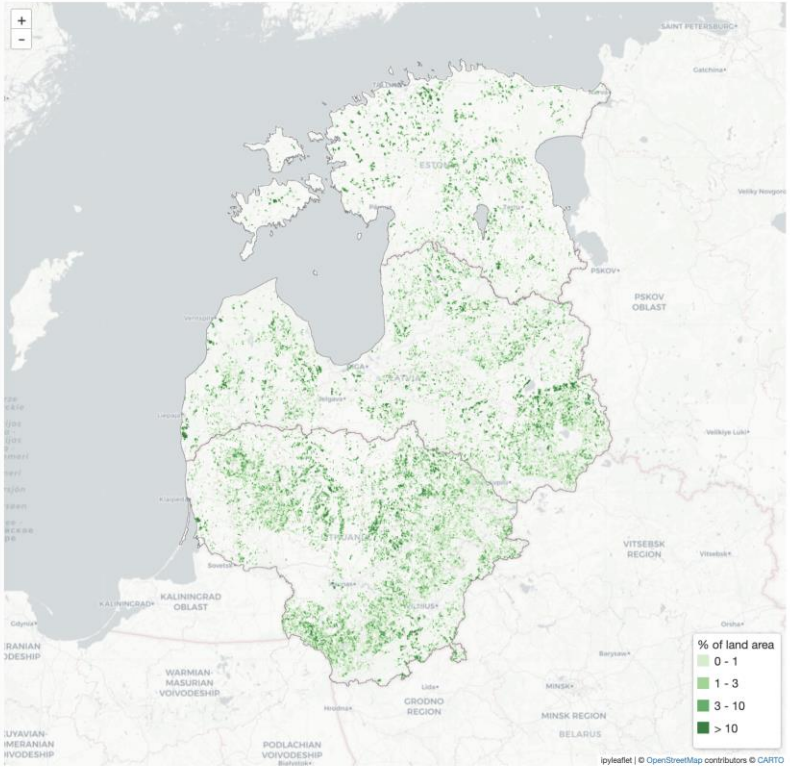
LVC312 Forest regeneration with pine in non-drained organic soil

LVC313 Strip harvesting in pine stand

IMPACT ON EMPLOYMENT IN 2050



APPLICATION OF SIMULATION TOOL



Select scenario:

LVC301 • CONVERSION OF CROPLAND TO GRASSLAND

Description

Conversion of cropland with nutrient-rich organic soil to grassland. Increased carbon stock in soil and below-ground biomass, reduced risks of nutrient leaching and soil erosion.

Select year:

(•) 2030 ( ) 2050

Estonia

Scenario area :	15 619 ha
GHG emissions :	-17 181 t CO_2 eq.
Profit :	-842 thous. EUR
Employment :	-23 full time persons

Latvia

Scenario area :	30 767 ha
GHG emissions :	-33 844 t CO_2 eq.
Profit :	-1 272 thous. EUR
Employment :	-81 full time persons

Lithuania

Scenario area :	40 764 ha
GHG emissions :	-44 840 t CO_2 eq.
Profit :	-1 727 thous. EUR
Employment :	-233 full time persons

OrgBalt LIFE project

EU LIFE Programme project "Demonstration of climate change mitigation potential of nutrients rich organic soils in Baltic States and Finland"

Thank you!

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The project "Demonstration of climate change mitigation potential of nutrients rich organic soils in Baltic States and Finland" (LIFE OrgBalt, LIFE18 CCM/LV/001158) has received funding from the LIFE Programme of the European Union and the State Regional Development Agency of Latvia. www.orgbalt.eu

Life

State Regional Development Agency Republic of Latvia

SILAVA

Ministry of Agriculture Republic of Latvia

Latvia University of Life Sciences and Technologies

University of Tartu

Luke Natural Resources Institute Finland

Lithuanian Research Centre for Agriculture and Forestry

Baltijas krasti

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