ANALYSIS OF FOREST ECOSYSTEM RESTORATION ON POST-MINE OIL-SHALE QUARRIES

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Opencast mining affects landscape, common land use and natural balance, and it is a serious environmental issue all over the world. A mining area might be relatively small on a world scale considering the land area and environmental effects, but its effects are much larger locally and regionally. Forest plantations can play a key role in harmonizing long-term rehabilitation of the ecosystem in restoring productivity, biological diversity and integrity on areas degraded by mining. The selection of exotic or native species needs careful consideration, because it may be necessary to use species combinations (native, exotic or combination thereof) that are capable of surviving in newly created conditions.

The study was carried out on three post-mine oil-shale quarries in northeast of Estonia in the hemiboreal vegetation zone in 2012. The experimental area with 143 plots of different tree species is established since 1968. The study includes a complex monitoring of forest stands, ground vegetation and soil.

AIDU

Area 34 km^2

1974-2012, afforested from 1981

Mostly *Pinus sylvestris* (52 plots) and *Betula* sp (8 plots)

VIIVIKONNA

Area 21 km^2

1936-1987, afforested from 1961

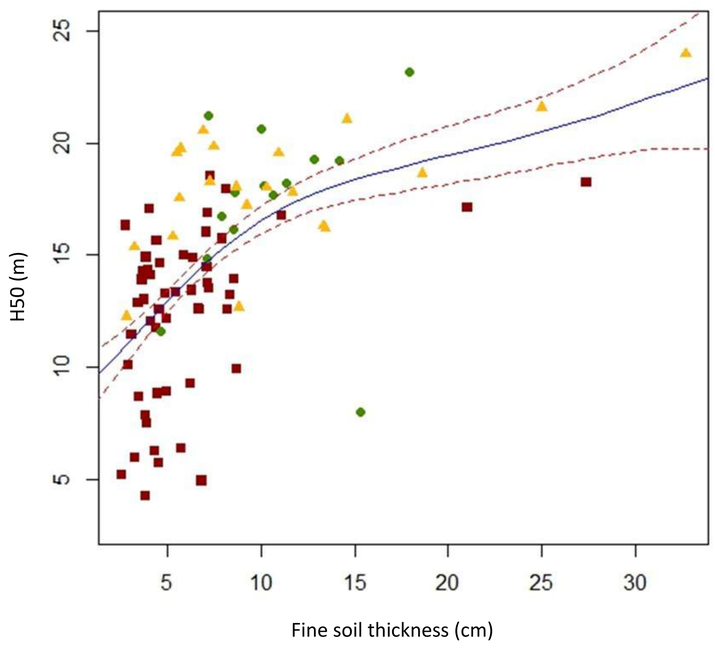
Pinus sylvestris (14 plots)

SIRGALA

Area 46 km^2

1962-2000, afforested from 1967

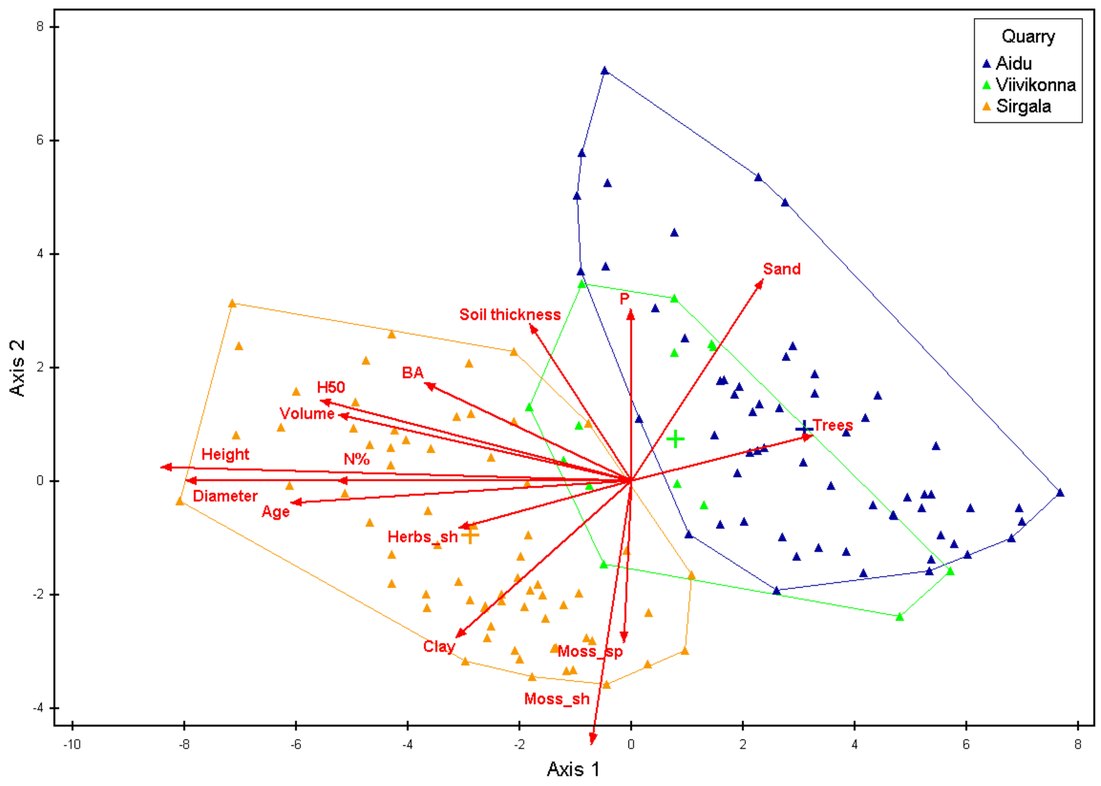
Pinus sylvestris (21 plots), *Larix* sp (39 plots), *Betula* sp (6 plots), *Picea abies* (3 plots)



Relationship between soil thickness and stand index H50. Squares—Aidu plots; circles—Viivikonna plots and triangles—Sirgala plots

The preliminary results are:

- soil thickness influences tree growth;
- the afforestation process is developing differently in three quarries;
- new suitable habitat is forming for threatened herbaceous species.



PCA ordination of plots by soil, understory vegetation and stand variables

Botrychium virginianum (I) *Malaxis monophyllos* (II) *Cypripedium calceolus* (II) *Epipactis helleborine* (III) *Epipactis atrorubens* (III) *Orchis militaris* (III) *Goodyera repens* (III) *Dactylorhiza fuchsii* (III)