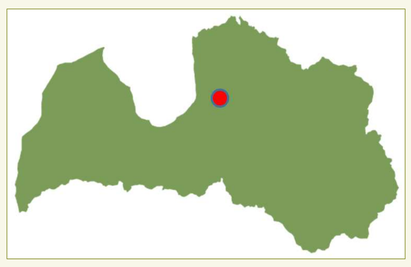
SUSTAINABLE AND RESPONSIBLE MANAGEMENT AND RE-USE OF DEGRADED PEATLANDS IN LATVIA

THREE-DIMENSIONAL HYDROGEOLOGICAL MODELLING IN LAUGA AND ĶEMERI MIRES

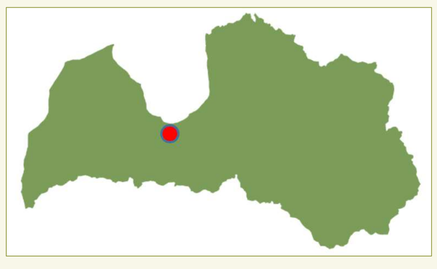
HYDROGEOLOGICAL AND HYDROLOGICAL STUDIES were carried out in two Project demo sites where restoration of peatland ecosystems degraded by peat extraction and drainage was planned. One of them is located in raised bog in Laugas purvs Nature Reserve and the other one in a small area of post-harvested peatland in Ķemeru Mire (Ķemeri National Park). To evaluate the hydrological and hydrogeological conditions in both experimental areas and their surroundings, as well as to find the most suitable solutions for rehabilitation and rewetting of post-harvested peatlands, three-dimensional modelling of water flows was carried out. 3D modelling results were used in the preparation of restoration sketch design and technical design.

AIM of the studies was elimination of problems found in both areas and at evaluation of peatland ecosystem recovery possibilities.



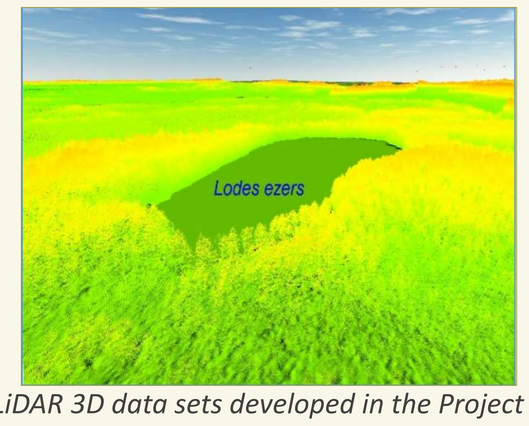
LAUGA MIRE NATURE RESERVE

Research area – the central part of the mire, size – 740 ha
Cranberries are grown in part of the area, some part is still used for peat extraction.
Two bog lakes – Lake Višezers and Lake Lode
Part of the bog is drained as it borders with the peat extraction fields



ĶEMERI MIRE

Research area – north-eastern margin, several hectares of bare, dry post-harvested peat fields where the rewetting had not achieved the expected result -the mire vegetation and peat accumulation had not recovered due to low water table by 2016.



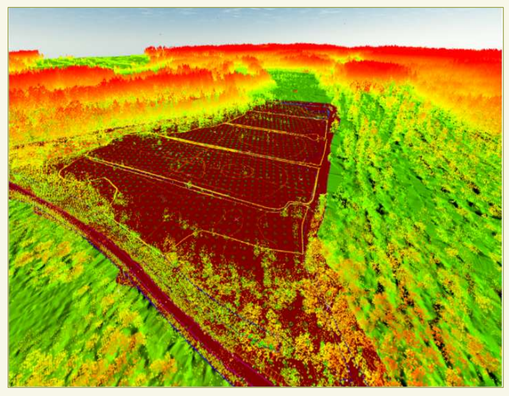
*LiDAR 3D data sets developed in the Project Lauga Mire (**O.Aleksāns**)*

THREE-DIMENSIONAL MODELLING

The three-dimensional models of the project sites were developed using the geospatial data set provided by Nature Conservation Agency. The digital terrain model is provided for modelling of:

- the surface and groundwater flow
- analysis of terrain slopes
- gradient analysis of water courses and drainage ditches
- identification of watercourse catchment basins
- analysis of mire surface morphometric parameters.

The digital terrain model is also being used for hydrogeological modelling of groundwater.



LiDAR 3D data sets developed in the Project Ķemeri Mire (O.Aleksāns)

HYDRO-GEOLOGICAL MODELLING OF WATER LEVELS

The model consists of eight layers and was used to:

- determine the distribution of groundwater table
- identify groundwater flows and elements of their balance
- assess the impact of drainage ditches on the overall status of groundwater in the pilot areas and their surroundings.

The study was conducted using Groundwater Vistas 6.

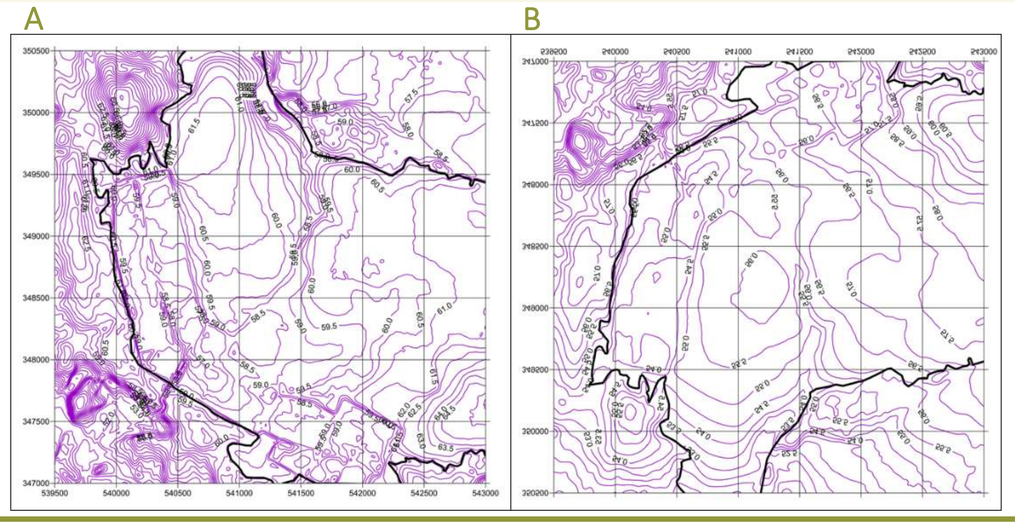


Figure - Modelled water tables at mire bottom B1 and in moraine gQ (Lauga Mire):
A – groundwater table in Layer B1 (m above the sea level);
B – groundwater table in Layer gQ (m above the sea level)
Map author – O.Aleksāns

RESULTS AND CONCLUSIONS

APPLICATION OF MODELLING RESULTS IN EXPERIMENTAL AREAS

- The modelling results of both territories were used for planning the rehabilitation of harvested peatland and rewetting of drained raised bog, for preparation of rehabilitation sketch design of experimental territory in Ķemeri Mire and technical design for Lauga Mire.
- The hydrological model of Lauga Mire allowed to indentify the boundary of Lake Višezers catchment area, which covers most part of the raised bog.
- Modelling in the experimental area in the Ķemeri Mire allowed to understand the complexity of this territory. It was found that in area where Sphagnum reintroduction was planned, the modification of hydrological regime was necessary in order to make the site suitable for Sphagnum mosses and other raised bog plant species.

ADVANTAGES OF THREE-DIMENSIONAL MODELS IN THE PLANNING OF MIRE ECOSYSTEM RESTORATION

- For mires, a poorly defined terrain is usually characteristic, and it is problematic and sometimes even impossible to correctly identify a watershed between two adjacent catchment areas using the traditional methods (maps of contour lines). The use of LiDAR data and the use of relevant software allows detailed and accurate morphometric analysis of the catchment areas even for very gently sloping mire areas.
- The advantage of spatial models is the possibility to define geometric parameters of surface water objects (width, length, depth of stream bed, longitudinal profile, etc.), which are very important data for the hydrological and hydraulic calculations. This method also identifies various obstacles (such as dams) in watercourses and drainage systems, can be used for for modelling of flooding.

Foto M.Pakalne

More info: **restore.daba.gov.lv**

restore.daba.gov.lv @LIFE_REstore liferestorelv LIFE REstore

Activities have been implemented with the financial support of European Commission LIFE programme and the Administration of Latvian Environmental Protection Fund, within the framework of project "Sustainable and responsible management and re-use of degraded peatlands in Latvia" (LIFE REstore, LIFE14 CCM/LV/001103).

Latvijas vides aizsardzības fonda administrācija
Dabas aizsardzības pārvalde
SILAVA
Latvijas Kūdras asociācija
BALTIJAS KRASTI