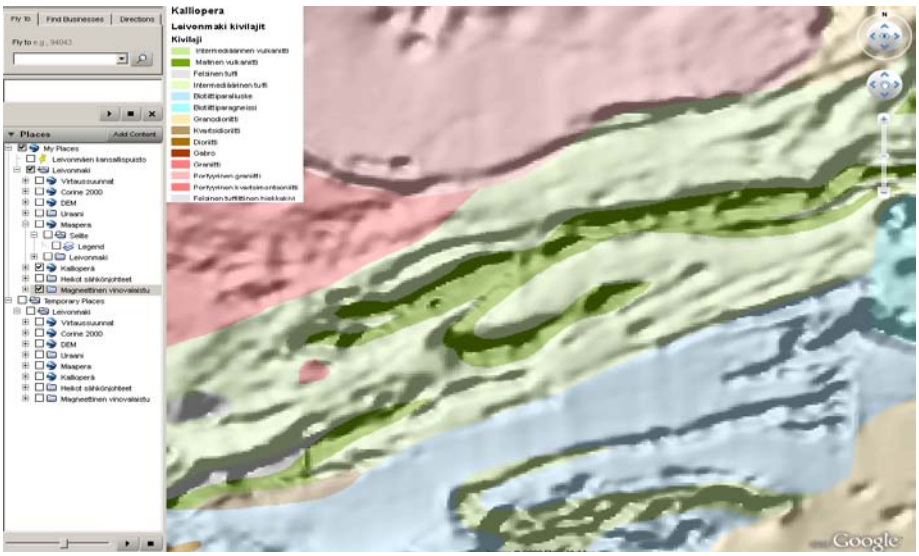
LEIVONMÄKI NATIONAL PARK

LUUPÄÄ TRAIL

GIS-BASED ASSIGNMENTS

Handbook for students and teachers



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Summary

The GIS-based assignments of Leivonmäki National Park are closely connected with the geologic nature trail (Luupään lenkki). The tasks are based on the PBL, which develops the processing skills of the learner's thinking, a problem-solving skill and science content knowledge. Place information can be used to support the geographical reasoning also and development of the state consciousness. The nature trail which utilises place information helps the learner to associate the geoscience with sense perceptions. Because the GIS-based tasks are solve with Google Earth, the outdoor as well as a classroom can serve as the learning environment. GIS data is available in Finnish in address: http://www.uef.fi/need/gis-leivonmaki, named as 'GIS -aineistot'.

Advance information and level

The tasks have been designed for the first course of geography of the upper secondary school. Before the doing of tasks the students' should have the following advance information: rock cycle, endogenic processes, exogenous processes (mainly processes after last Ice Age), weathering processes, growth of plants and the understanding of effects of site factors. Geophysics: Ahvenisto ym. (2004). Geofysiikka. Tunne maapallosi. WSOY.

Objectives

The objective of tasks is to analyse and synthesise by Google Earth the landscape and the last Ice Age that has been learned in the theoretical studies of the physical geography.

Curriculum links

The curriculum of the upper secondary school emphasis that the student ” can get, can interpret and can estimate critically geographical information, such as maps, statistics, written, digital and other medium sources and can utilise information technology in many ways in the presenting of geographical information”.

Time required

The tasks spread over 3x45 minutes. Every single task can be solve separately or simultaneously with the Google Earth. The students can do the exercises, either alone or by collaboration. It is important to leave time to the end of the lesson for the consideration and connecting the tasks to the theoretical studies.

GIS materials needed

- Bedrock map
- Map of quaternary deposits
- Direction of the glacier

- Uranium gamma radiation
- CORINE land cover
- Magnetism map
- Conductivity map
- Digital Elevation Model (DEM)

The tasks need also the basic map which can be examined in Kansalaisen Karttapaikka. By putting N 6865465, E 3448834 to the search screens as coordinate information, Koli National Park will be found. Do not write letters in the search screen.

Assessment

The tasks develop the geographical thinking, which is estimated in regard to the student's knowledge and skills. The fact whether the learner perceives regional dependences is estimated especially. In the evaluation a skill to interpret and to estimate a geographical GIS data also is taken into consideration. Estimated skills are: analysing skills, handling skills and presenting skills of the geographical information such as interpretation skill of the map and the student's cooperative skills.

Activity 1: Kettle hole

(The first course of the geography of the upper secondary school)

Task description

The birth of kettle hole is connected to the clacifluvial sand and gravel movement and to the time period when ice sheet melted in its place is examined by the map of quaternary deposits. Furthermore, connections between a vegetation and soil are regionally examined. With the overlay analysis of the map of quaternary deposits and DEM sand and gravel the material is studied.

Learning objective

To understand the birth of the kettle hole and its' location. Examine elements about the connections between soil and vegetation.

Time required

About 45 minutes

How to do?

Make the map levels active by putting the barb to the screen on the front of the map level. When you examine several map levels simultaneously, you can adjust the transparency of the map levels with a slide. Then a map level to be examined must be active (it is seen shaded). You need a basic map in your work also. You can load it for example from the Kansalaisen Karttapaikka.

Tasks

1. On what kind of soil type the kettle holes appear in Leivonmäki? Why? What does the location of kettle hole explain about the birth of kettle hole? *(Required materials: map of quaternary deposits and basic map.)*
2. Locate the kettle hole of the info table on the CORINA and on the basic map. What is the typical forest type close to kettle hole? Why? How broad the suppa of the info table is? *(Required materials: map of quaternary deposits, bedrock map, CORINA and basic map.)*
3. Examine the drawing on Figure 1. Consider why the buried ice block has not moved with the ice sheet.
4. Study how wide an area the gravel material has spread in the southern parts of Leivonmäki National Park compares spreading into the DEM. What do you perceive? How do you explain your observation? *(Required materials: map of quaternary deposit and DEM).*

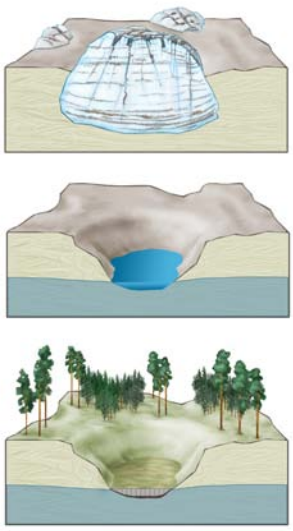

Figure 1. Birth of the kettle hole. In the enclosed picture mire has formed on the bottom of the kettle hole. Also in Leivonmäki there is mire at the bottom of deep kettle hole. What does it tell about? (Picture: Harri Kutvonen, GTK).

Activity 2: Erratic boulder

(The first course of the geography of the upper secondary school, elements of geophysics)

Task description

The regionality of the erratic boulders is studied by the map of quaternary deposits and basic map. Furthermore, it is introduced to the soil and bedrock magnetism and conductivity and the properties of the minerals of the bedrock.

Advance information of tasks

The magnetism is caused by bedrock and soil and their properties. The gamma radiation is mainly from the depth of a few centimetres. There are small amounts of uranium which frees the gamma radiation when weathering particularly in granitic bedrock. The weak electricity conductivity describes mainly the bedrock but the conductivity of the soil also. The magnetism occurs on the map as a "relief" figure. The stronger the radiation of the uranium is the redder it is seen on the map. The red colour also refers to a bigger conductivity.

Learning objective

To understand the birth and location of the erratic boulder. To understand elements about geophysics and properties of minerals and rock types.

Required time

About 45 minutes

How to do?

Make the map levels active by putting the barb to the screen on the front of the map level. When you examine several map levels simultaneously, you can adjust the transparency of the map levels with a slide. Then a map level to be examined must be active (it is seen shaded). You need a basic map in your work also. You can load it for example from the Kansalaisen Karttapaikka.

Tasks

1. The east coordinate of the erratic boulder is 3447951 and the north coordinate is 6865497. Locate the erratic boulder from the basic map. What do the coordinates tell?
2. Where do erratic boulders mostly locate in Leivonmäki National Park? Why? *(Required materials: map of quaternary deposits, basic map and DEM).*
3. From which cardinal point has the erratic boulder been located into its' present place? *(Required materials: basic map and direction of the glacier).*
4. The erratic boulder consists of granite. What are the main minerals of granite? What other minerals could there be in the erratic boulder? Why? *(Required materials: magnetism map, bedrock map and direction of the glacier).*
5. Your friend claims that there are significantly ore minerals in Leivonmäki National Park. You propose the clarifying of the claim. From which cardinal point is it worthwhile to start to study? *(Required materials: bedrock map, magnetism map, conductivity map).*
6. Study what kind of rock types is located in the weak conductivity area. *(Required materials: bedrock map and conductivity map).*

Activity 3: Peat

(The first course of the geography of the upper secondary school, soil geophysics)

Task description

Connection between the occurrence of peat and soil type is studied. It is studied how peat appears by comparing regionally map quaternary deposits and basic map. The thicknesses of the peat layers are estimated by the gamma radiation. CORINA is used to estimate the growth stages of forests and the evaluation of human action. With GIS the interpretation skills of the basic map also are developed.

Advance information of tasks

The gamma radiation is mainly from the depth of a few centimetres. There are small amounts of uranium which frees the gamma radiation when weathering particularly in granitic bedrock. The weak electricity conductivity describes mainly the bedrock but the conductivity of the soil also. The stronger the radiation of the uranium is the redder it is seen on the map.

Learning objective

To understand peat formulation and the site factors of mires.

Time required

About 45 minutes.

How to do?

Make the map levels active by putting the barb to the screen on the front of the map level. When you examine several map levels simultaneously, you can adjust the transparency of the map levels with a slide. Then a map level to be examined must be active (it is seen shaded). You need a basic map in your work also. You can load it for example from the Kansalaisen Karttapaikka.

Tasks

1. Which part of Leivonmäki National Park mires mostly locate? Why? *(Required materials: map of quaternary deposits, DEM and basic map).*
2. How are the mires seen on the gamma radiation map? Why? *(Required materials: map of quaternary deposits and gamma radiation map).*
3. How has the human action influenced land use in Leivonmäki National Park of or in its vicinity? *(Required materials: basic map, CORINA).*
4. Where on the eskers are mires? Why? *(Required materials: map of quaternary deposits and basic map).*
5. Locate the clay area in the Leivonmäki National Park and consider why those areas have not become mires. *(Required materials: map of quaternary deposits).*