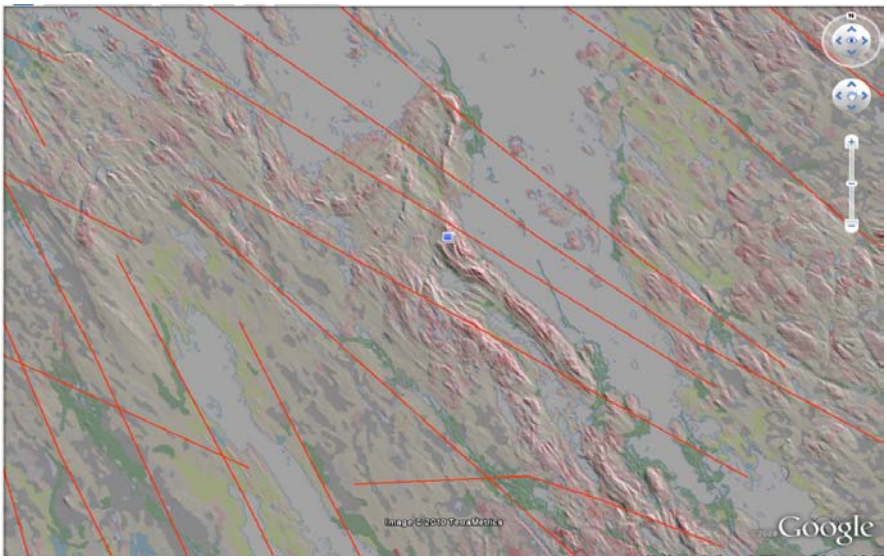
KOLI NATIONAL PARK

GIS-BASED ASSIGNMENTS

Handbook for students and teachers



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Need
Northern Environmental Education Development

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Summary

The GIS based assignments for Koli National Park have been drawn up according to the principles of the problem-based learning, which develop geographical thinking. Furthermore, spatial information can be used to support the geologic knowledge as a part of the developments of the spatial thinking. The geologic information is bound to the certain place and the bedrock and its properties affect the many regional occurrences of phenomena. In the tasks it is become acquainted to bedrock and soil and how they affect the landscape and flora of the Koli National Park. The aero-geophysical materials of tasks help to combine physics and chemistry with the physical geography in the upper secondary school. The tasks are made with a free downloadable Google Earth. GIS data is available in Finnish in address: https://www.uef.fi/need/gis-koli, 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.

Objectives

The objective of tasks is to analyse and synthesise by Google Earth the information 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 4x45 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 7002238 E 3641997 to the search screens as coordinate information, Leivonmäki 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: Rock and soil examination

Task description

Bedrock map and map of quaternary deposits are compared in the Google Earth. A rock and the connections between soils are examined. Furthermore are examined how soils have been regionally divided in the study area. Considering how the resistance to abrasion of the rock types affects a relief.

Objectives

To understand the bedrock and its' connections between soil. To learn how the erosion of the different rock types affect the topography of the earth's surface.

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. If you find regularities between a bedrock and soil, think why regularities occur. Are there similarities on the direction of the glacier and in the occurrence of the moraine? Do you find an erratic boulder in the basic map? What does the occurrence of erratic boulders tell? *(Required materials: bedrock map and map of quaternary deposits, direction of the glacier, basic map.)*
2. Think about what factors have affected the soil formulation (podsozation). Why there is it not stratified sand and gravel at the Ukko-Koli? Why also moraine leached from Ukko-Koli is often a quite thin layer? *(Required materials: bedrock map and map of quaternary deposits, DEM).*
3. Introduce yourselves, for example, in the address: <http://www.gtk.fi/geotieto/jokamies/ohjeita.html> to minerals physical properties and rock types of Koli area. Examine the regional occurrence of quartzite and subvolcanic rocks and compares rock types occurrence to DEM. Think about how Ice Ages have eroded the bedrock. Do you find likenesses between the relief of Koli National Park and the bedrock properties? Examine the relief of subvolcanic rocks e.g. diabase? What do you perceive and why? *(Required materials: bedrock map, DEM).*

Activity 2: How do bedrock and soil influence to vegetation?

Task description

Connections between vegetation and soil and bedrock are compared. Considered how soil affect the human action such agriculture in Koli National Park and its' environment.

Learning objective

To learn the connections between soil, bedrock and vegetation. To understand the connection between soil and human action.

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. Think what the plant needs in order to grow. Where are nutrients from?
2. Think how the soil infiltration differs in the moraine areas and gravel areas. Make a hypothesis and study the connection between the forest types and soil. Do you find logical likenesses? How is the connection between soil to the vegetation seen in the nature? Look

at the photographs that have been taken from Koli National Park in the address (Google Earth > Maantieteellinen verkko >Panoramio). Did your hypothesis come true? You can, of course, hike in the National park. *(Required materials: bedrock map, CORINE, DEM.)*

3. Examine which part of Koli National Park there are most mixed forest and broad-leaved forest? What kind of bedrock is in the area? What connection is between soil and bedrock and rich vegetation? *(Required materials: bedrock map, CORINE).*
4. Examine the environment of Lahnajärvi that is located in the northern part of Koli. What kind of soil types is there? What kind of relief and soil types are in the environment of Lahnajoki? What people do in the environment of the lake? *(Required materials: map of quaternary deposit, DEM, basic map).*
5. Examine which part of Koli National Park the soil type is gravel or sand. What is the direction of soil formulation? How do you explain the orientation? *(Required material: map of quaternary deposit).*

Activity 3: Rock and soil gamma radiation (uranium), magnetism and soil conductivity

Task description

Rock and soil radiation, magnetism and conductivity of the soil are regionally studied. Geophysical material is combined with physical geography and GIS teaching. The tasks require Foreknowledge of the magnetism and radiation.

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 elementary knowledge of rock and soil (uranium) gamma radiation, magnetism, soil conductivity.

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).

Tasks

1. Get information from the address <http://stuk.fi/> and familiarize yourselves bedrock and soil (uranium) gamma radiation in the Koli National Park. Examine after your studying how the uranium radiates from the bedrock and soil of the area of Koli? What do you perceive and how do you explain the phenomenon. *(Required materials: map of quaternary deposit, uranium gamma radiation).*
2. Get information, for example, from the address <http://www.gtk.fi/geotieto/jokamies/ohjeita.html> and consider how magnetism and the minerals and rock types radiation properties appear in the bedrock of Koli National Park. Study how the magnetism of the bedrock appears regionally. What do you perceive? *(Required materials: bedrock map, magnetism map).*
3. Examine how the conductivity of the bedrock appears regionally. What do you perceive? Think about the reasons for the variations of the conductivity from the bedrock. What likenesses do you perceive in bedrock and soil conductivity and magnetism? Why? How the water systems are appear on the conductivity map? Why? *(Required materials: bedrock map, conductivity map, magnetism map).*

Activity 4: Mires and peat formation

Task description

Introducing mires and peat formation in Koli National Park. It is especially introduced the geologically significant mire, Kolinuuron suo. It is studied peat formation and mires location in Koli.

Learning objective

To understand the mechanisms of woodland peat formation. To learn to interpret the basic map and to integrate knowledge to bedrock map and map of quaternary deposit to the information of basic map.

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. Examine the basic map and pinpoint the location of Kolinuuron suo (mire). Consider what kind of soil and bedrock is beneath the mire. What do you perceive? *(Required materials:*

basic map, bedrock map, map of quaternary deposit, DEM).

2. Think about the reasons why Kolinuuron suo has developed to the present place. Think why you cannot see the Kolinuuron suo on the map of quaternary deposit. *(Required materials: bedrock map, DEM, basic map).*
3. Think about the different ways of peat formation and consider why Kolinuuron suo has developed in the specific bedrock bruise.
4. Examine where there are mires in other parts of Koli National Park. Do you find factors which are common to the location of mires? *(Required materials: basic map, CORINA, DEM, bedrock map, map of quaternary deposit).*
5. Study the (uranium) gamma radiation. What do you perceive? How do you explain the phenomenon? Do you see Kolinuuron suo? *(Required materials: uranium gamma radiation map,CORINA).*