

Study Module for

“RIVER PROCESSES”

Geo Lab at Nordland National Park Centre



HANDBOOK for TEACHERS



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1 SUMMARY OF MODULE

This study module is related to the Nordland National Park Centre and its close surroundings. The area has many interesting Geological features and cultural monuments from earlier times. The module is aimed at understanding a Geological phenomenon in nature, river terraces, and their formation based upon using a Geo Lab installation. The valley, Saltdalen, has very many river terraces which is easy to see and access.

Fluvial (river) terraces are elongate terraces that flank the sides of floodplains and fluvial valleys all over the world. They consist of a relatively level strip of land, called a “tread,” separated from either an adjacent floodplain, other fluvial terraces or uplands by distinctly steeper strips of land called “risers.” These terraces lie parallel to and above the river channel and its floodplain. Because of the manner in which they form, fluvial terraces are underlain by fluvial sediments of highly variable thickness.

Fluvial terraces are the remnants of earlier floodplains that existed at a time when either a stream or river was flowing at a higher elevation before its channel down cut to create a new floodplain at a lower elevation. Changes in elevation can be due to changes in the base level (elevation of the lowest point in the fluvial system, usually the drainage basin) of the fluvial system, which leads to head ward erosion along the length of either a stream or river, gradually lowering its elevation. For example, down cutting by a river can lead to increased velocity of a tributary, causing that tributary to erode toward its headwaters. Terraces can also be left behind when the volume of the fluvial flow declines due to changes in climate, typical of areas, which were covered by ice during periods of glaciations, and their adjacent drainage basins (Source Wikipedia).

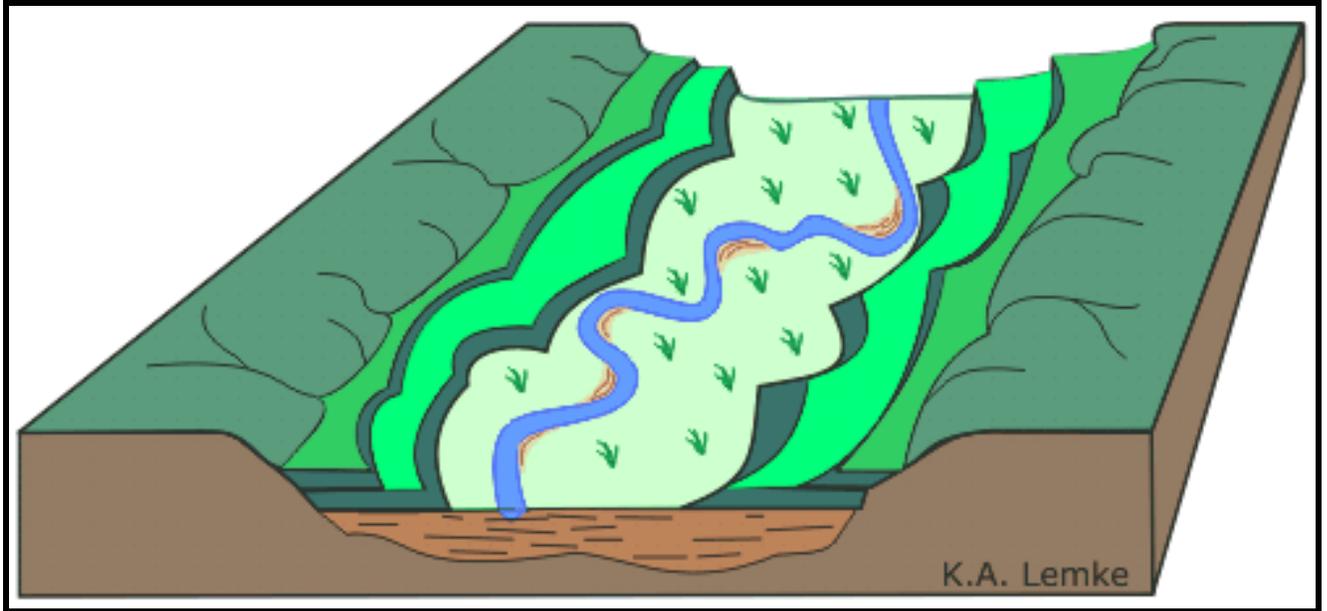


Illustration: http://www.uwsp.edu/Geo/faculty/lemke/Geomorphology/images/04_fluvial_terraces.gif



Photo: <http://coolGeography.co.uk/A-level/AQA/Year%2012/Rivers,%20Floods/Rejuvenation/Rejuvenation.htm>

The pedagogical philosophy for this study module focuses on activity, reflection and discussion about how river terraces are formed in the landscape, and the module aims at providing stimulating environments to study these through hypothesizing and exploration (working with the Geo-Lab and studying river terraces in nature. It is important that the teacher lets the students explore the Geo-Lab without giving out any fixed answers. By building up knowledge about glacio fluvial processes, students will have a keener eye for details in nature.

Basic skills are also developed through this module. Students practice expressing themselves orally when working in groups and writing when recording findings. They must describe their own experiences and observations after formulating questions and hypotheses. Natural science terms and concepts are used when working. Arguing for one's own assessments and giving constructive feedback is important in the natural science subject.

1.1 LEVEL

This module can be given at several levels (see curriculum links below).

1.2 OBJECTIVES

To learn about geology and formation of the landscape in Saltdal Municipality.

1.3 CURRICULUM LINKS

Main subject areas are The Budding Researcher from the Natural Science Subject Curriculum and Geography from Social Studies Subject Curriculum.

Table 1: Explanation of curriculum terms

The budding researcher

Extract: Natural science ... is a process consisting of natural science methodologies for developing knowledge. This involves the formulation of hypotheses, experimentation, systematic observations, openness, discussions, critical assessment, argumentation, grounds for conclusion and presentation.

Geography

Extract: The main subject area focuses on the place and spatial dimension of society. This main subject area provides an overview of the location and extent of natural and man-made conditions on earth. Surveying and discussing change processes are key elements of this subject.

1.3.1 COMPETENCE AIMS AFTER YEAR 4

The budding researcher

- use natural science terms to describe and present his or her own observations in various ways

Geography

- use pictures, film and other sources to tell others about important landscapes and terrain formations in Norway
- describe terrain formations and Geographical terms by exploring the terrain around the school and their home

1.3.2 COMPETENCE AIMS AFTER YEAR 7

The budding researcher

- formulate questions on something he or she is curious about, prepare a plan for examining a hypothesis he or she has formulated, carry out the examination and discuss the result
- explain why it is important to make and test hypotheses through systematic observations and experiments, and why it is important to compare results

Geography

- register and sort traces left by the ice age in the place where he or she lives and explain what the ice age meant to the formation of the terrain and the country as a whole

1.3.3 COMPETENCE AIMS AFTER YEAR 10

The budding researcher

- keep records during experiments and fieldwork and present reports using digital aids
- explain the importance of looking for relationships between cause and effect and explain why argumentation, disagreement and publication are important in natural science

Geography

- describe and explain natural and cultural landscapes in the local community

1.4 TIME REQUIRED

3 hours: 1 hour exploring the Geo Lab and 2 hours excursion to the river terraces.

1.5 APPARATUS/MATERIALS

- Student work book
- Work sheets
- Teacher's handbook
- Geo Lab
- GPSs



1.6 ASSESSMENT

The assessment is to address the pupil's learning and progress in the different areas of learning. The pupil's progress and work skills are assessed in relation to the objectives. It is preferable to assess learning during the whole learning process. Assessment of this module will be conducted by the school.

2 ACTIVITIES

Table 2: Activities /Tasks in the learning process:

Activity 1: Exploring the Geo Lab

Activity 2: Studying River Terraces in Nature

2.1 ACTIVITY 1: EXPLORING THE GEO LAB

2.1.1 DESCRIPTION

The Geo Lab is an installation that can be manipulated to form artificial river terraces and deltas. Water and sand are flushed down a ramp which can be elevated at different angles. A water basin at the end of the ramp allows for deltas to build up.

2.1.2 LEARNING OBJECTIVES

To experiment with the formation of river terraces and deltas and understand the processes.

2.1.3 TIME REQUIRED

One hour

2.1.4 MATERIALS NEEDED

The Geo Lab, student work books and work sheets 1a and b

2.1.5 INSTRUCTIONS HOW TO CARRY OUT THE TASKS

After a theoretical introduction about how river terraces form, students are divided into groups and given work sheets 1a and b. They then do practical experiments with the Geo Lab making sand river terraces form on the ramp and river deltas in the water basin. They discuss what angles give the landforms in question.

3.1 ACTIVITY 2: STUDYING RIVER TERRACES IN NATURE

3.1.1 DESCRIPTION

The National Park Centre lies close to the meeting point of two rivers.

3.1.2 LEARNING OBJECTIVES

To study river terraces in nature.

3.1.3 TIME REQUIRED

Two hours

3.1.4 MATERIALS NEEDED

Student work books, work sheet 2a and b, GPSs

3.1.5 INSTRUCTIONS HOW TO CARRY OUT THE TASKS

Students are divided into groups and given work sheet 2a and b and GPSs. They venture outside to the starting point of the excursion. Using a map they record the river terraces (using GPS), counting them from present river bed (work sheet 2a). When returning they follow the river back and experience the geological terms in real life (work sheet 2b).