

# Environmental Risk Analysis of Villingsberg proving ground sector 5

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Erasmus+



## Abstract

This report covers the environmental aspect of military activities on Villingsberg proving ground sector five. Samples of water were analyzed and compared between outside and inside the facility, as well as other tests on pH and rate of conductivity in water. It was found that the military area has high concentrations of heavy metals and low pH in bodies of water. It was concluded that the area should be seen as a risk zone from an environmental standpoint. Actions should also be taken to improve the environment - both to ensure good health of officials and for the local animals, as well as allowing bioproserity in the area.

## Purpose

The aim of the work is to get a better picture of the military's impact on the environment at Villingsberg proving ground sector 5, and to practice investigations in a scientific way as well as to compile data in a scientific article.

## Question

Is it worth sacrificing large parts of Kilsbergen for military activity from an environmental point of view?

## Bakgrund

Villingsbergss proving ground is a military exercise field located in northern parts of Kilsbergen outside Villingsberg - between Örebro, Karlskoga and Nora. When the proving ground was established in 1943, 11300 hectares became closed compounds. In connection with this people within the area were forced to leave their homes. The establishment of Villingsberg proving ground has had reactionary opinions ever since.

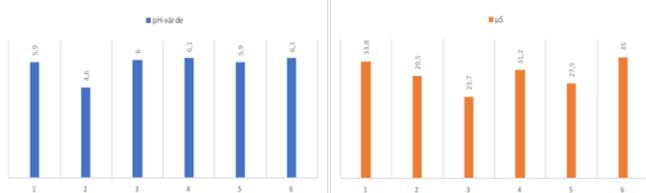
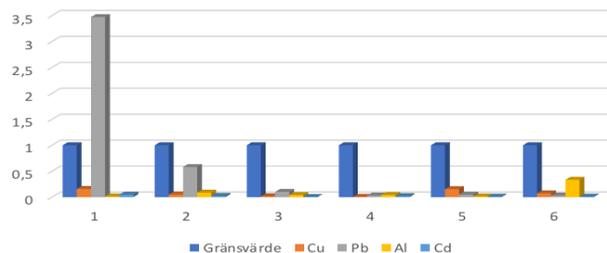


## Metod

Water samples from six bodies of water (three from sector five and three from outside) were analyzed for levels of metals, conductivity, acidity as well as rate of water replacement. The recording of concentrations for different substances took place at Örebro University (ORU) with the guidance of Viktor Sjöberg (Doctor in Environmental Science), the analysis was done with ICP-MS. Conductivity was measured with a conductometer and acidity was measured using an electronic pH meter. The measurement of water replacement was carried out with the "Orange method" and with a measuring stick. The measurements of the stream's different depths was combined with the width of the stream to find the cross-sectional area. Then the amount of water passing per second was calculated by combining the cross-sectional area and the time it took for the orange to travel the controlled distance (runoff value). The time of water replacement was then calculated by dividing the total volume of the lake by the corresponding drainage value. The area of all lakes were found using Google Earth and depth was retrieved from sources.

## Data

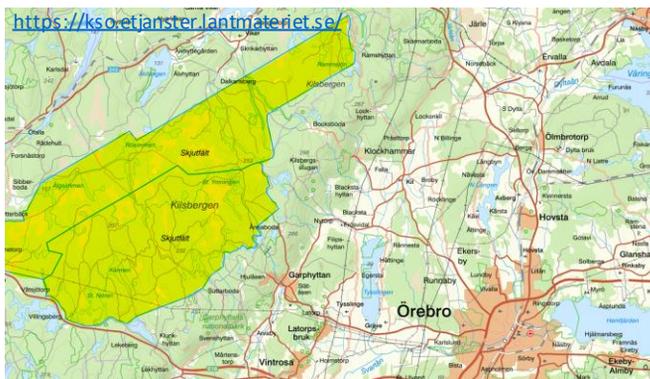
Cu, Pb, Al, Cd - Andel av gränsvärde (=1)



|                      | Björktjärnen | Stormossen | Hällsjö  | Svarttjärnen | Axsjön     | Falkasjön   |
|----------------------|--------------|------------|----------|--------------|------------|-------------|
| Vattensättning (tid) | ~2 veckor    | *          | 5 veckor | ~1,5 vecka   | ~40 veckor | ~3,5 veckor |

## Sammanfattning

The report reveals that the environment has been damaged by military activities and that the proving ground has become an unsafe environment for both humans and other animals. Apart from unexploded shells, the proving ground is assessed as a hazard zone according to this report. This is due to high values for toxic metals despite good drainage and circulation of water in the area. An action to clean the firing range is necessary to prevent continued environmental degradation and dangerous conditions for civil servants and local life.



## Källor

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