Case study: Habitat analysis in the Swiss National Park

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Introduction: What is the guiding principle of this case study?

The Swiss National Park would like to install new, visually appealing information boards for the visitors. These information boards should show potential habitats for different animal species and give background information about the animals. To provide a range of displays to choose from, your task is to:

1. spatially and quantitatively capture the potential habitats of two species of your choice using a Geographic Information System (GIS)
2. prepare your results as thematic maps for the information boards
3. present your approach and results at an interim and a closing event.

Preparing the interim and final presentations you will see that alternatives exist for solution strategies, data processing and data preparation. You will learn to critically discuss the different results and evaluate the advantages and disadvantages of individual strategies. In addition, you will learn to defend your findings and answer critical questions in a discussion setting.

Learning Objectives

- Critical examination of a simple problem-based task and identification of the main questions and goals of that task
- Identification, selection, combination and application of GIS functionalities
- Preparation of (GIS based) task plans and work process diagrams
- Conversion of processed GIS data into thematic map products for information boards
- Presentation of results

1.1 Task

1.1.1 Background and problem description

With an area of 172 km^2 , the Swiss National Park (SNP) is the largest wildlife protection area in Switzerland. The World Conservation Union (IUCN) classifies the park as a category I (highest protection class) reserve. The SNP is located in eastern Switzerland in the Canton Graubünden's Engadin and Münstertal valleys.

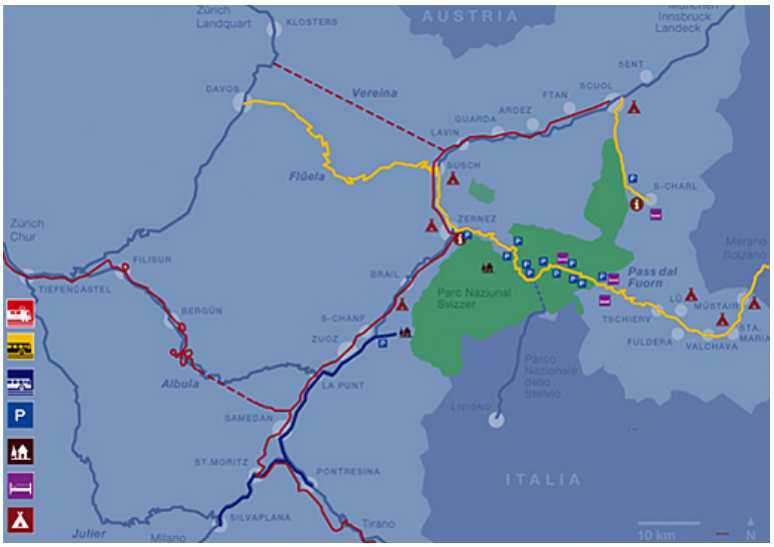

Figure 1: Location of the Swiss National Park (SNP) [**?**]

The Swiss National Park is renowned for its alpine species richness and untouched landscape and attracts approximately 150,000 visitors per year. The park administration would like to install new, visually appealing information boards for the visitors. These information boards should show potential habitats for different animal species and give background information about the animals. To provide a range of displays to choose from, your task is to:

1. spatially and quantitatively capture the potential habitats of two species of your choice using a Geographic Information System (GIS)
2. prepare your results as thematic maps for the information boards
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1.1.2 Data set

1. GIS data

The following GIS-data have been made available to the GITTA consortium by the Swiss National Park. Interested none-GITTA partners please contact the GITTA coordinator (coordinator@gitta.info) (mailto:coordinator@gitta.info).

DEM	Raster	Spatial resolution: 10 x 10 m Compiled by the SNP's GIS workgroup
Water network	Coverage	Geostat data
Road network	Coverage	Main streets Compiled by the SNP's GIS workgroup
Hiking trails	Coverage	Mapped by the SNP's GIS workgroup
Park huts	Coverage	Mapped by the SNP's GIS workgroup
Park boundary	Coverage	Mapped by the SNP's GIS workgroup
Geology	Coverage	Mapped by the SNP's GIS workgroup
Vegetation	Coverage, dbf-Datei	Mapped by the SNP's GIS workgroup, based on [**?**]

Table 1: Legend missing

2. Information on habitats

Informations on potential habitat requirements is available for the following species: Rock Ptarmigan, Capercaillie, Black Grouse, Hazel Grouse, chamois, marmot, mountain hare.

Download: Habitats.zip (www.gitta.info/SNPHabitat/en/download/Habitats.zip)Filesize: 350kB. Type: zip.

3. Additional information and literature

See list of references (bibliography (www.gitta.info/SNPHabitat/en/text/SNPHabitat_bibliography.html)).

1.2 Processing instructions

1.2.1 Problem analysis

Have a good look at the task you have been assigned and the case material available. Determine from the case material which habitats you would like to process and map. Carefully consider which GIS-data, GIS-tools, and GIS-methods are necessary to solve the given problem. Even in this early phase you should spend some time thinking about the map layout and your presentation and about which software you will use for these tasks.

You are required to write a learning diary from this phase onwards. Please use the Learning Diary template. Learning diary. (www.gitta.info/SNPHabitat/en/download/Learning_diary.doc). Filesize: 44 KB. Type: doc.

1.2.2 Planning

Compiling a task plan

Organize and plan your work sequence - from planning to presentation - using a task plan. Set milestones and estimate the time required for each task. At the end of a phase, compare the time it took to actually complete the task to your target time. Please use the Task Plan template. Task plan. (www.gitta.info/SNPHabitat/en/download/Task_plan.doc). Filesize: 57 KB. Type: doc.

Do not underestimate the effort required to compile an informative, ambitious thematic map.

Creating workflow diagrams

Set up two workflow diagrams for processing GIS data (one per animal species). First develop a rough concept for your workflow diagrams which includes at least the following information:

1. input data
2. how the input data are combined (your solution strategy)
3. output data and results.

This first draft is not meant to be a perfect proposal for solution but your main idea and solution strategy should become clear.

You will present your task plan and your workflow diagram to your class and discuss them with your classmates. After successfully completing this phase (green light from your supervisor) you may begin the realization phase.

The trial-and-error experience during the realization phase will help you to continuously refine your workflow diagram and eventually to come up with detailed diagrams showing your approach and the corresponding process steps.

1.2.3 Realization

Proceed with your data processing, analysis and preparation according to your task plan and workflow diagram. Refine your diagram step by step to show your approach in a traceable way.

The expected results for this phase are:

- data processing
- the refinement of your work sequence diagram
- the analysis and cartographic representation of the results (if possible with quantitative analysis)
- the production of graphs for the final presentation in which you will explain your approach by means of the iteratively built workflow diagram and present your results (thematic maps for the information boards)

The thematic maps should display the results of your habitat analyses for both species. The layout design must conform to cartographic requirements. You can select a suitable map sheet size.

1.2.4 Information exchange

During the final event you will give a 10 minute presentation (for instance a PowerPoint presentation), which includes your approach and your maps. Following the presentation there will be a discussion.

Since different solution strategies are possible, this phase will allow you to get to know and discuss the strategies that your fellow students used.

1.2.5 Evaluation

Your evaluation of your work will be based on:

- Your preparation of the task plan and the workflow diagrams
- Your realization and refinement of the workflow diagrams
- Your transformation of the GIS data to thematic maps with particular focus on the layout
- Your presentation
- Your participation during the sessions (discussions)

Precondition for verification: Your approach and learning reflections written in your learning diary have to be comprehensible to your supervisor.

This phase does not require your active participation.

1.3 Background information

General information

: Page 13.

This unit is only visible in author view. Here you will find the following background information on the case study:

- Didactic considerations for the case study
- Recommendation: communication possibilities
- Recommendation: Time line / mile stones
- “Indiscernible problems and other comments
- Proposed solution

1.3.1 Didactic considerations for the case study

Why two habitats?

Background considerations for processing two potential habitats are as follows: the students will first get to know the material and develop a strategy for a habitat as well as consider the necessary GIS tools and processing steps. Since the material is new to them, it will take longer to process these steps. By means of a second habitat they will repeat the working and processing steps and thereby deepen and strengthen their knowledge

Work sequence diagrams

At the conclusion of phase 3 (Planning) (www.gitta.info/IntroCSs/en/) the tutor cannot expect the students to deliver two perfectly detailed work sequence diagrams on the new material. The goal of this phase is for students to develop two rough concepts that reflect input data, their basic ideas (linkages), as well as output data and results.

All students will present their rough concepts in the form of a interim presentation and then discuss them with their fellow students. After successful completion of this phase (ok by tutor) the students can start the realization phase.

By means of experiences and trials during the execution phase the students will be able to refine their working sequence diagrams to a detailed final form depicting their approach with the corresponding processing steps.

Cartographic aspects	The cartographic requirements will vary between schools but the learning goals of the GITTA Basic Module "Cartographic representation should be implemented as the minimum requirements. Similarly, the program to use for preparation of maps is not restricted in this case study. Regarding the case study task, it is up to the student if they create one or two map layouts.
Presentation	The interim and final presentations are thought to simulate situations that students might encounter frequently during their professional life or also at conferences: Students have to convincingly demonstrate their work to their contractors and answer critical question posed by their fellow students. Each student is both a agent (=presenter) and a contractor (=listener). Additionally, students will learn about and discuss alternative ways to find solutions, data processing and preparation.
Individual or team work	This case study is suited for both individual work and working in pairs.

1.3.2 Recommendation: Communication possibilities

It is recommended to make the introductory, interim, and final presentations mandatory sessions.

Test phase experiences have shown furthermore that students appreciate a regularly scheduled (e.g. weekly) meeting time when they can access tutorial help if they so choose.

1.3.3 Recommendation: Time line - mile stones

The diagram below emphasises the time line structure of this case study. Depicted are the 6 phases of a case study, the hourly estimates for each phase, as well as mile stones.

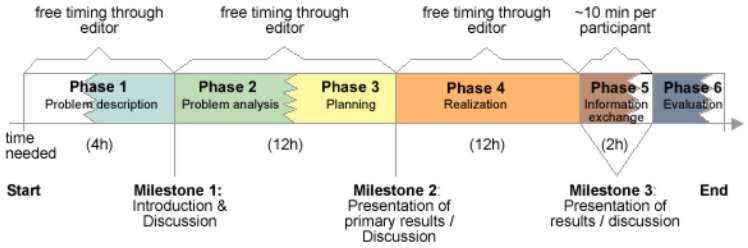

Figure 2: Zeitplan.jpg

Start:	The students receive all case study materials for their disposal. They are expected to familiarize themselves independently prior to the mandatory introductory session (M1).
Mile stone 1: introductory session (mandatory)	At the end of phase 1, the students will be informed of the important dates (mile stones) and ways of communication at a mandatory session. This will give students a chance to discuss problems and have questions answered. Following this session the students can start with the problem analysis and planning, according to their own time management.
Mile stone 2: interim presentation (mandatory session)	Test phases have shown that a mandatory session to present their work sequence diagrams and discuss them with their tutors is meaningful for students after phase 3 (planning). This also helps the tutor to follow students' thought processes more easily. Following the ok by their tutor students can start with the execution, according to their own time management.

Mile stone 3:	At the final presentation the students will present their work results in a 10 minute presentation to their fellow students followed by a 5 minute discussion.
Final presentation (mandatory session)	
End	End of the case study.

1.3.4 Indiscernible problems and other comments

1. The shapefile "vegetation originates from a coverage of larger aerial extent. Values for area and perimeter of polygons have not yet been updated.

2. Habitat requirement descriptions for this case study includes knolls and dells for some of the species. Students should consider if it is meaningful to calculate these features for an elevation map with a cell size resolution of 20 x 20 m

1.3.5 Solution proposition

Below you will find a suggestion for a model solution (in German). solution proposition. (www.gitta.info/SNPHabitat/en/download/Musterlosung.pdf). Filesize: 182 KB. Type: pdf.