

## Case Study

# WATERSHED DELINEATION

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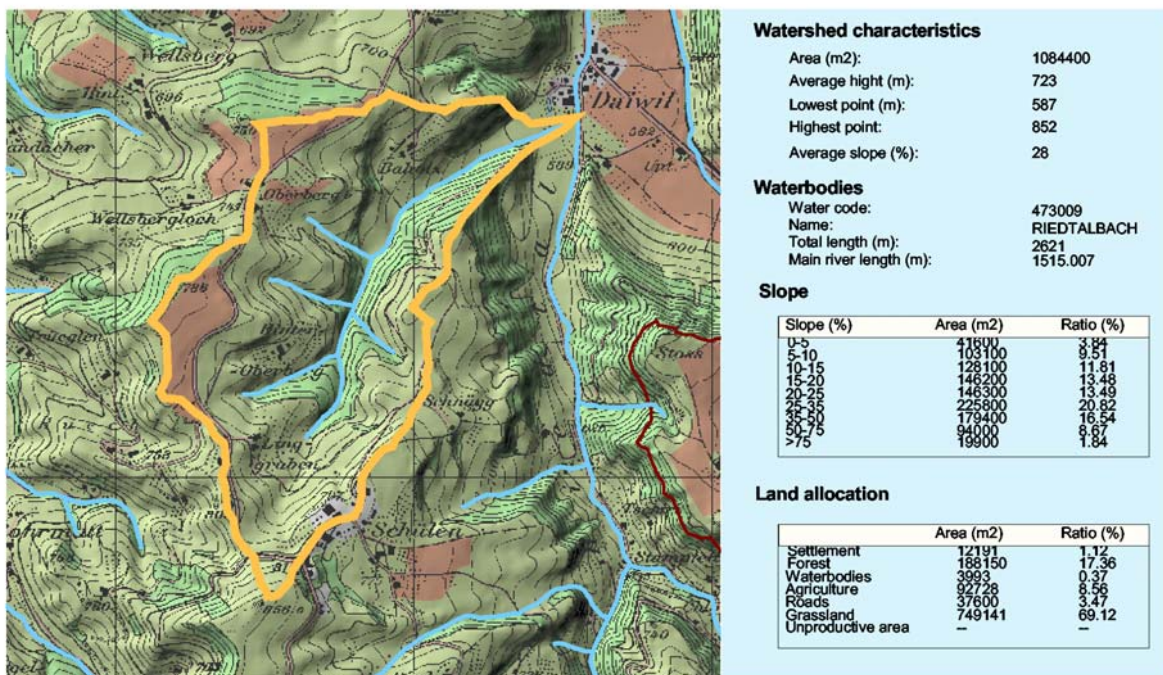
**Keywords:** Watershed delineation, catchment statistics, hydrology

### Description of Application

Watersheds are very often used as basic unit for sustainable natural resource planning. In the past watersheds were delineated manually based on contour lines. Modern Geographic Information System (GIS) Technologies offer the potential to perform the delineation of watersheds in an automated manner. The GIS – Coordination office of the State of Lucerne has developed a GIS application with a User-friendly interface for watershed delineation and specification of watershed relevant parameters. This tool is specially designed for non GIS users: The user defines the pour point of a desired watershed interactively. Based on this specified pour point the application automatically delineates the watershed based on the digital terrain model. Furthermore following basic statistic figures are automatically computed and displayed for the catchments of interest:

- Catchment area
- Slope classes
- Land Cover (forest, settlement, agriculture, unproductive area, road, water)
- Total length of linear hydrological features within the watershed
- Highest and lowest elevation point
- Mean elevation
- Mean slope

In addition a cross-section along the main river channel is produced. The watershed and the above mentioned biophysical parameters are presented in form of a map.



## **Benefits**

The mentioned GIS application facilitates many planning and management issues in the field of hydraulic planning and engineering:

- Automatic watershed delineation
- Presentation of the key biophysical characteristics of each watershed
- User-friendly interface
- The application can be easily extended

## **Issues**

At the moment the application is only used by hydraulic engineers as a basis to estimate potential discharge at a watershed's pour point. To be able to use the described application in the broader context of sustainable natural resource management following additional statistics should be provided

- Soil types, mean water retention of soils
- Fraction of sealed surface
- Climatic data
- Land use
- Flow regime
- Man made linear drainage features
- Population and census data

## **Data used**

- Digital terrain model and its derivatives (e.g. slope, flow accumulation, flow direction)
- River network
- Land cover data

## **Funding**

The GIS Coordination Office of the state of Lucerne implemented this application on demand of the Department of Public Works in 2001. The Department of Public Works has the mandate and budget to manage the areas of traffic, streets, bridge construction and water. The GIS application for watershed delineation is successfully used as a daily working instrument within street and settlement planning for estimation of high water.