



Simple DamBrk

A cost-effective GIS tool for a simplified prediction of the downstream flooding produced by a failure of a concrete dam

Version 1.0

S1. User skills

Simple-Dambrk is a software developed to provide essential information for dam-break analysis of a concrete dam failure including: (i) the evaluation of the instantaneous breach outflow discharge, (ii) downstream flood propagation, and (iii) downstream flood-prone area map.

The software is implemented in python, a free programming language.

Proper Simple-Dambrk execution requires: (i) basic knowledge of python language to run the script (ii) GIS skills (ex. QGIS) to prepare and handle input data; and (iii) specific expertise for a correct and reliable interpretation of the results.

S2. Software requirements

Simple-Dambrk can be run on any operating system (Linux, Windows, Mac OS X) since it is a multi-platform application. The requirement to run the Simple-Dambrk is to install:

- python 3.7 with gdal libraries

it is recommended to also have QGIS 3.x installed to prepare and handle input data.

As an alternative to installing python it is possible to run the tools directly from QGIS 3.x. Just install the ScriptRunner plugin in QGIS and execute two scripts, like those in the example, in sequence:

- SanGiulianoDam_upload_data.py
- SanGiulianoDam_calc_dambrk.py

Where SanGiulianoDam_upload_data.py performs the upload of the input data into a geodatabase and SanGiulianoDam_calc_dambrk.py performs all the calculations for the dam-break flood map delineation.

The output map is stored into a geodatabase feature class called: FloodExtend.

All the intermediate files are stored in a system dir that has the same name as the DamID.

S3. Input data for the example case of San Giuliano dam

In the **SanGiuliano_data** folder, there are sample input data of the San Giuliano dam.

- **SG_dams.shp** : point shapefile containing the dam data
 - DamID: unique id of the dam in the geodatabase
 - Name: name of the dam
 - DamType: Type of the dam: G=Gravity dam, V=Arch dam
 - ResVolMcm: Reservoir total capacity in million cubic metric
 - Height_m : Hydraulic height in meter: height to which the water rises behind the dam
 - BreachWidth: Average width of a hypothetical breach in the dam
- **SG_River_path.shp** : linear shape file of the river downstream the dam, the line must be digitized from upstream to downstream

- **SG_MainCrossSec.shp**: linear shapefile of the main river cross-section downstream the dam, the lines of the sections in the shapefile must be inserted from upstream to downstream, each line must join two points, the first on the left bank and the second on the right bank.
- **SG_StudyArea.shp**: polygon shapefile of the polygon that defines the outline of the study area
- **SG_ClipDTM.tif**: geotif raster of digital terrain model clipped by the polygon boundary of the study area

S4. Sample data for the historical case of Gleno dam- break

In the folder **Gleno_data** there are data to simulate the historical case of the collapse of the Gleno dam.

Most of the data is taken from the supplemental data, freely available for scientific purposes, by

Pilotti, M., A. Maranzoni, M. Tomirotti and G. Valerio, The 1923 Gleno dam-break: case study and numerical modelling, J. Hydr. Engrg. Volume 137, 480, 2011

To perform the case of the Gleno dam execute two scripts:

- GlenoDam_upload_data.py
- GlenoDam_calc_dambrk.py