# Introduction

Most part of existing large-scale flood risk maps are incomplete, and there is a wide variety of models used and level of detail adopted.

Large-scale analyses often face a range of practical difficulties, for example, due to:
- the significant amount of data and parameters needed for traditional models;
- the coarse resolution of data available at a global scale and the sparse availability of high-resolution data.
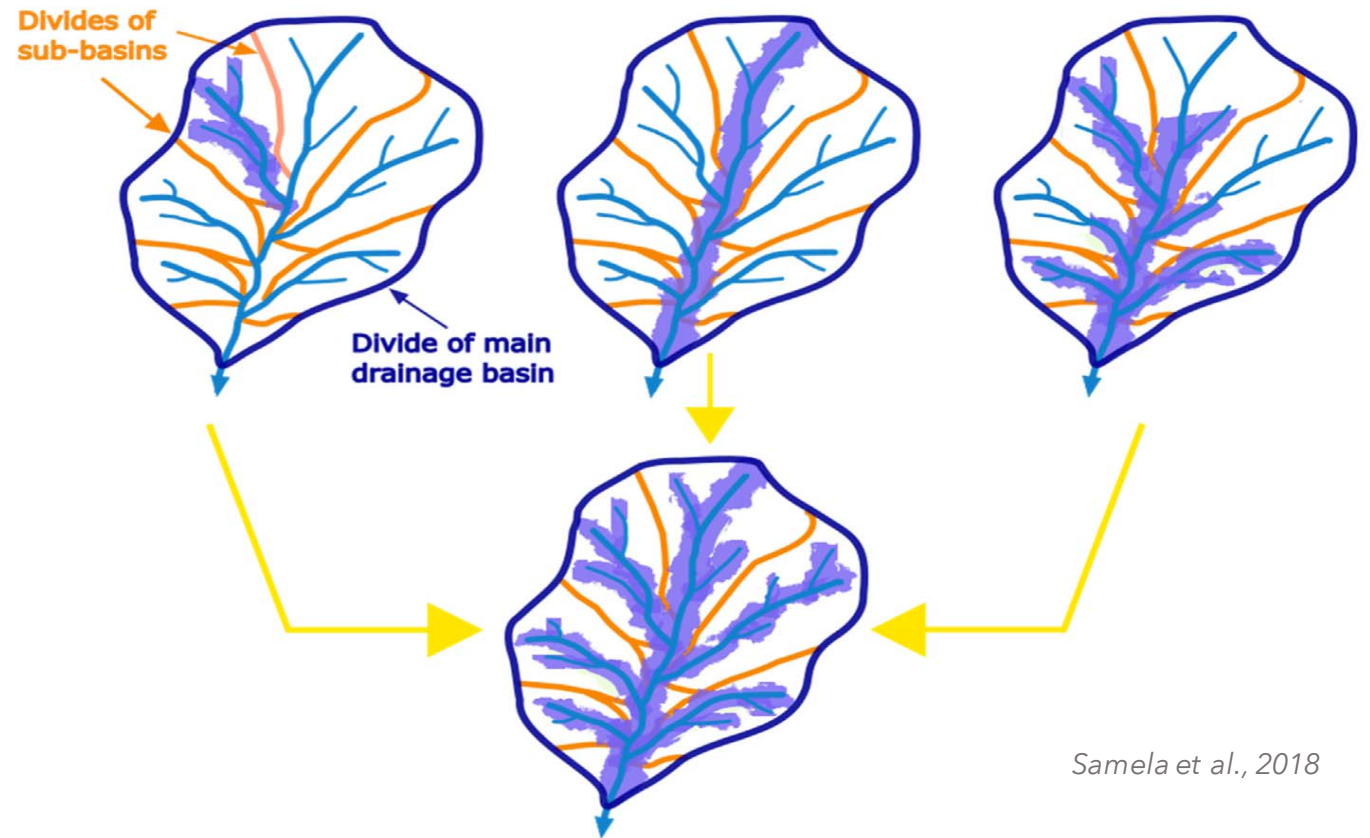

Samela et al., 2018

This image shows how the proposed model may be used to derive a complete water depth map starting from incomplete flood hazard map.

Methodology

The present study proposes a cost-efficient method for a large-scale analysis and mapping of direct economic flood damage at medium resolution in data-scarce environments.

The proposed methodological framework consists of three main stages:

i. deriving an hazard map through a DEM-based geomorphic method using a linear binary classification;

ii. generating an exposure land-use map developed from multi-spectral Landsat 8 satellite images using a machine-learning (Artificial Neural Network) classification algorithm

iii. performing a flood damage assessment using a GIS tool based on the vulnerability (depth-damage) curves method.

2
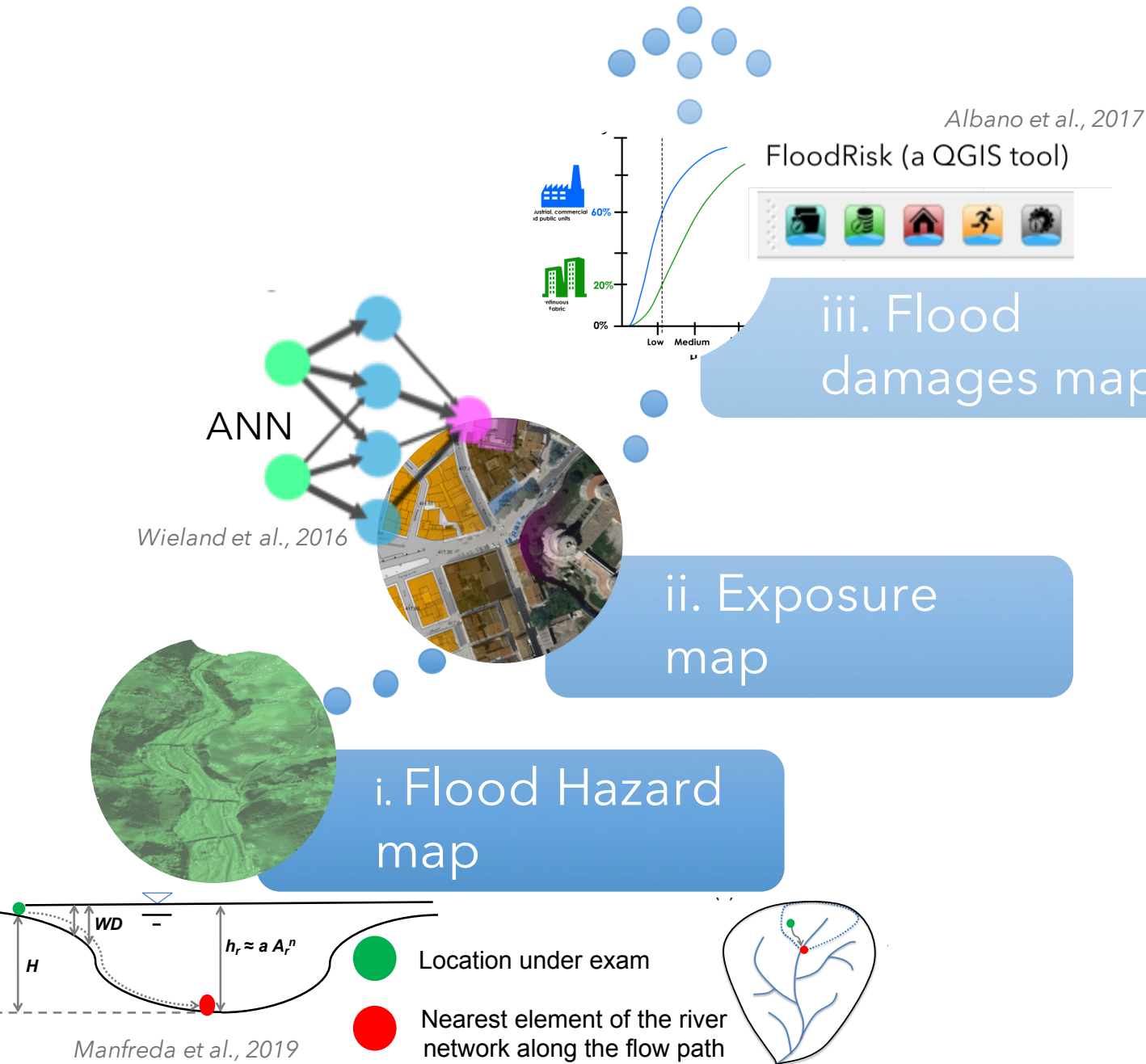
Application for Romania

The proposed integrated method was applied over the entire country of Romania (including minor order basins) for a 100-year return time at 30-m resolution.

This shows how the proposed method can enhance the **completeness and spatial details** of existing flood hazard and damage maps.

The use of global datasets enable **rapid assessments** of flood risk for policymakers in regions where there is **little data available**.
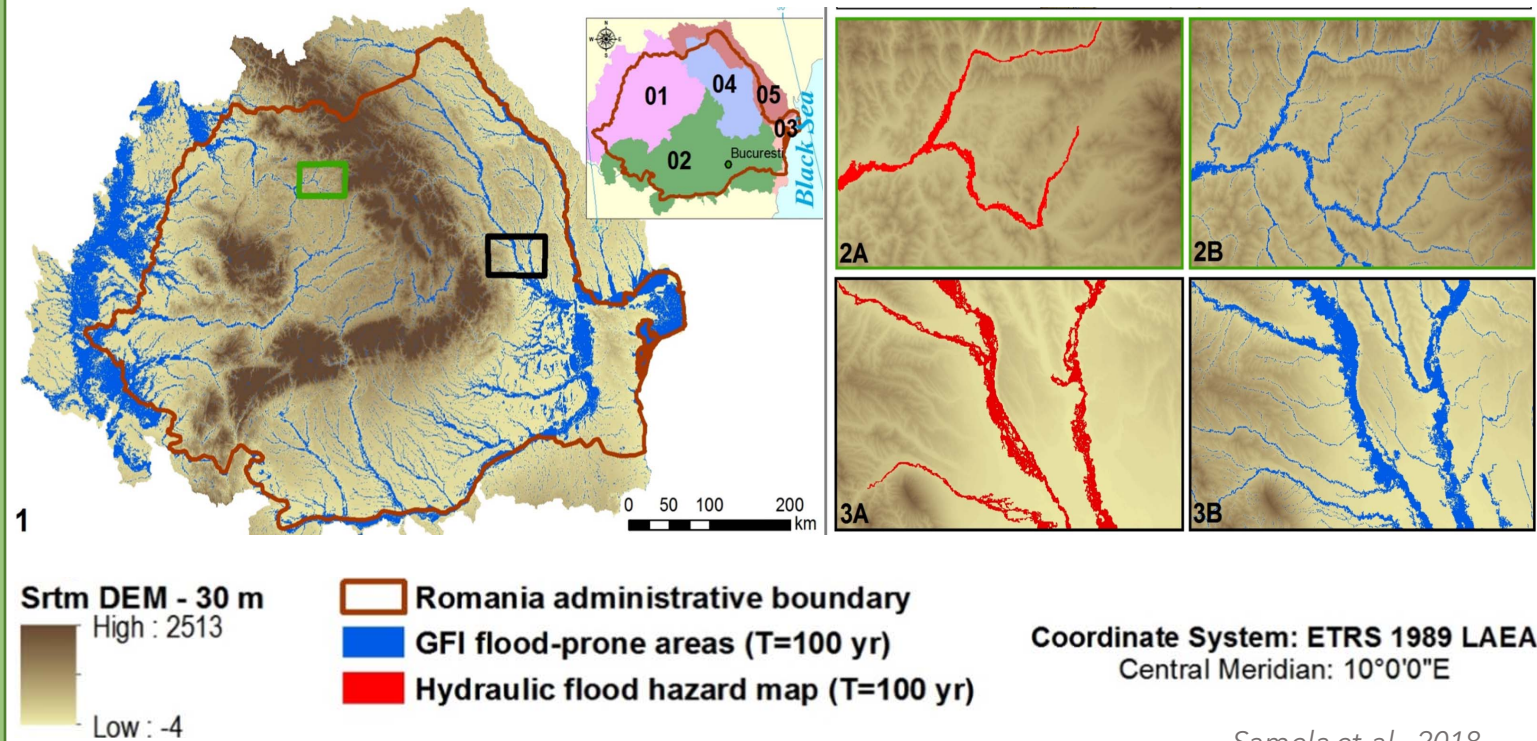
Samela et al., 2018

Panel 1 represents the five major drainage basins identified to study the entire Romania. It also shows the 100-year flood hazard areas.

The two couples of images (panels 2 and 3) provide a more detailed comparison between geomorphic flood-prone areas and the JRC pan-European flood hazard used to calibrate the linear binary classification.

Reference

- Albano et al., Large Scale Flood Risk Mapping in Data Scarce Environments: an Application for Romania, Water, under revision.
- Albano et al. FloodRisk: a collaborative free and open-source software for flood risk analysis, Geomatics Natural Hazard and Risk, 2017
- Manfreda et al., A DEM-based method for a rapid estimation of flood inundation depth, Journal of Flood Risk Management, 2019.
- Samela et al., An open source GIS software tool for cost effective delineation of flood prone areas, Computers, Environment and Urban Systems, 2018.
- Wieland et al., Large-area settlement pattern recognition from Landsat-8 data, ISPRS J Photogramm Remote Sens., 2016