

Master Thesis Topic  
**Assessing Water-related Ecosystem Services: Value of Blue-Green Infrastructure in Flood Regulation**

**Introduction:** In urban scale, built-up surfaces such as asphalt and concrete pavements absorb much less water than natural land covers. So, heavy rains produce overland flow which runs off quickly and overwhelm cities' storm-water drainage systems. In contrast, blue and green infrastructures and non-structural areas minimize flood risks through collecting and storing the rainfalls on vegetation, in the soil column, or in surface depressions and accordingly they are able to reduce the peak discharge of a flood. **The aim of this research** is to map and quantify the contribution urban and peri-urban blue-green infrastructure and non-structural land cover contribute to Flood regulation.

It is also expected that the research will use a case study from Ruhr region (*Ruhrgebiet*) and be conducted by applying **Artificial Intelligence for Ecosystem Services (ARIES)** networked software technology and/or **Google Earth Engine (GEE)** platform.



Figure 1: Land classification based on satellite imagery (source: GLOBAL ECOSYSTEM CENTER, 2016)

**Activities:** The study is conducted through customizing ARIES Flood regulation model, feeding the model with local data, and validating the results using remote sensing techniques in GEE. The student will conduct his/her research at Uni. Duisburg-Essen. The main activities consist of:

- Literature review on the approaches to ecosystem services evaluation, blue green infrastructure, peak discharge of a flood, the influence of different natural land cover and soil types on the peak discharge of a flood,
- Training on ARIES software, land cover classification, spatial analysis tools, and remote sensing techniques in GEE platform,
- Data collection and selection,
- Model development.

**Organization:** Supervisors are M.Sc. Adnan Habibipourzare and Prof. Dr.-Ing. André Niemann from the University of Duisburg-Essen. It is the obligation of the student to deliver three hard copies and a digital version of the thesis. Furthermore, a presentation of 20 minutes and defense of approximately 20 minutes is part of the evaluation procedure of the master thesis. A modification of the proposal is possible in agreement with the supervisors; the modification must be documented.

**Date:** 29.11.2018