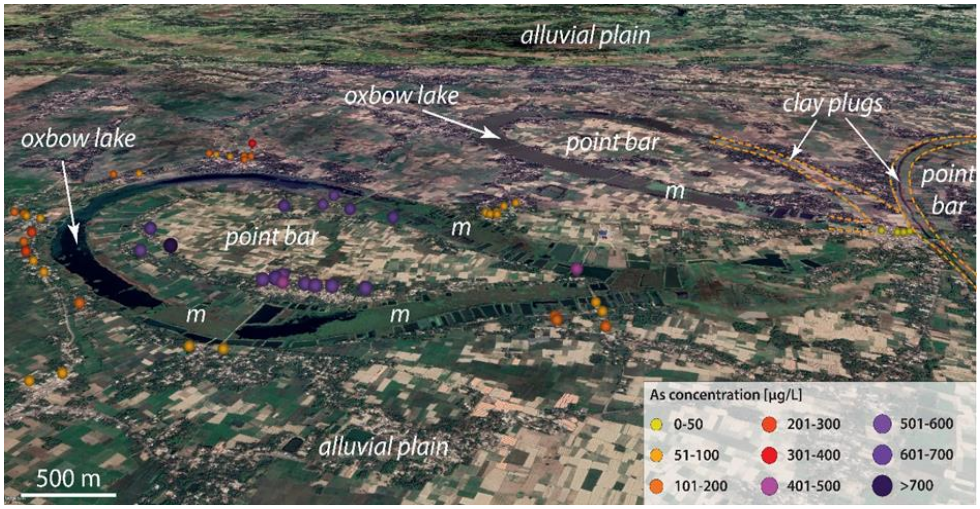
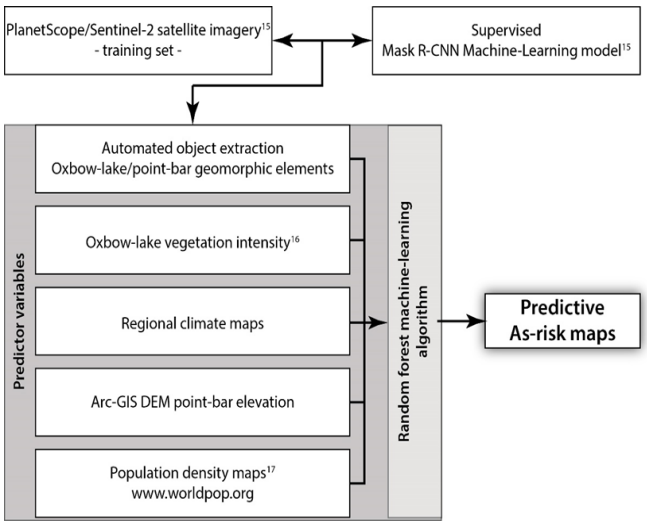
MSc thesis project

Identifying Arsenic Contamination Hotspots using Machine Learning



Geomorphological constraints of arsenic hotspots



Possible workflow for the automated production of arsensic risk maps.

Goal

Goal of this project is to apply a neural network (e.g. Mask R-CNN), trained and applied on Sentinel-2 or PlanetScope satellite imagery, for automatic production of detailed maps of oxbow-lake/point-bar geomorphological objects. The map views are combined with a set of predictor variables as input for e.g. a Random Forest classification to assess arsenic contamination impact. Possible predictor variables include spatial and temporal NDVI variations to characterize oxbow-lake vegetation intensity and local climate effects and DEMs combined with population density maps to identify the coincidence of point-bar locations with topographic high grounds and population areas.

Introduction

Groundwater contamination with naturally occurring arsenic poses a serious health threat of global proportions, affecting >200 million people, leading to chronic diseases and various types of cancer. In terms of surface area and number of potentially affected people, Holocene alluvial basins such as the Ganges-Brahmaputra Basin in SE Asia are by far the most contamination-prone environments. The enigmatic nature of arsenic hotspot occurrence is a large challenge for successful application of sustainable mitigation measures. Recent research pinpoints abandoned *oxbow lakes* and sand-prone *point bars* as potential Arsenic hotspot sites in alluvial-basin landscapes. This insight opens opportunities for the application of machine-learning techniques for remote sensing based automatic arsenic hotspot detection.

What will you do?

The work will be performed at the Dept. of Geoscience and Remote Sensing. It will be considered to perform the data processing in Google Earth Engine in combination with using Python libaries such as TensorFlow and Pythorch.

More information and Supervision

The supervision team will notably include Rick Donselaar, m.e.donselaar@tudelft.nl and Roderik Lindenbergh, r.c.lindenbergh@tudelft.nl