

## 1. Motivation

The state of Saxony is aiming at an increase in forest cover. This afforestation effort is supposed to enhance related ecosystem services such as carbon sequestration, the recreational potential and landscape aesthetics of the state. We hypothesise that the impact of afforestation on recreational potential will be spatially varied by social and environmental factors such as topography and accessibility.

## Objectives

- ◆ To quantify the current utilisation of recreation services by counting geo-referenced photographs from Flickr via InVEST recreation model
- ◆ To identify factors (e.g. land cover) to explain the current usage patterns
- ◆ To identify the preferred landscape compositions by automatically labelling the Flickr photographs

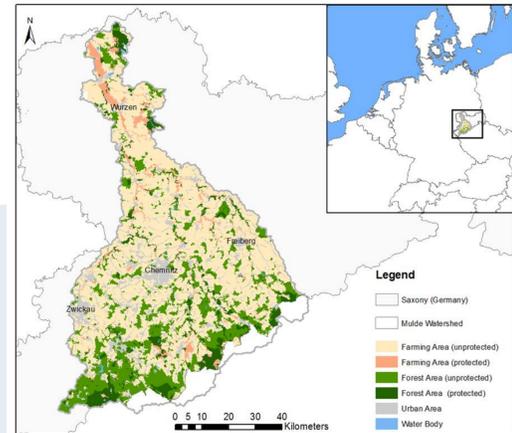


Fig1. Study Area: Mulde watershed in Saxony (Map from Jungandreas et al. 2015 (in prep) )

## 2. Methods and Materials

**Study Area :** the Mulde watershed in the western part of the German state of Saxony (Fig.1)

### 1) InVEST-Recreation Model (Sharp et al. 2015)

Model the distribution of person-day of recreation, “photo-user-days” by socio-ecological variables

### 2) Viewshed analysis

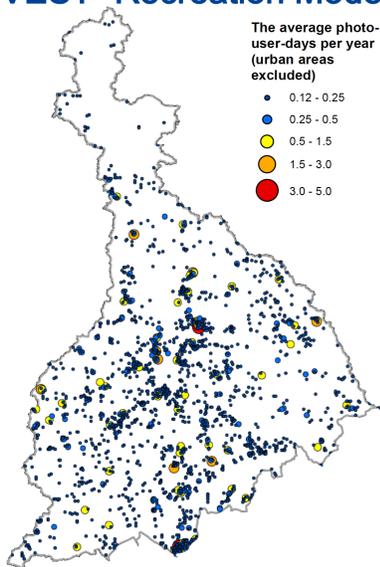
Identify areas that can be seen from the observation locations (where the high number of photographs were taken) and which observers can see which locations

### 3) Photo labelling

To compare the result from the GIS analysis and to analyse landscape preference, the Flickr photographs taken in the identified hotspots are automatically labelled using machine learning algorithms.

## 3. Preliminary Results and further plans

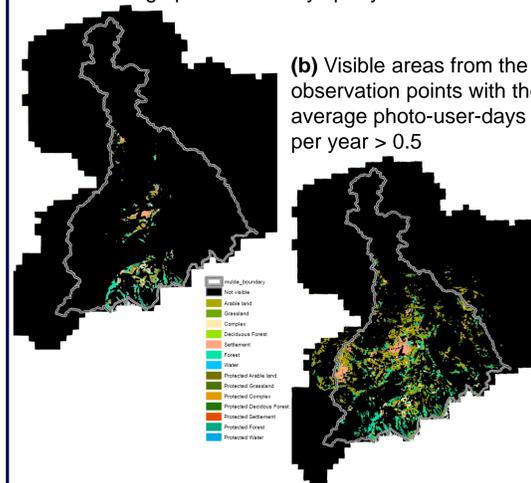
### 1) InVEST- Recreation Model



1. Extract urban areas
2. Identify locations with the high number of photographs taken as view points

### 2) Viewshed Analysis

(a) Visible areas from the observation points with the average photo-user-days per year > 2



1. Identify visible areas from observation locations
2. Test the relationship with environmental factors (e.g. land cover patterns)

### 3) Image Analysis



## 4. Expected results and outlook

Researches on the recreation demand are typically conducted based on site-specific surveys or interviews (Wood et al. 2013, *Sci. Rep.*). Using social media data such as Flickr photographs provides an opportunity to understand and to quantify recreational services, and shows which landscape compositions were preferred. Recreation potential could further be analysed with the viewshed analysis to identify factors which influence person-day of recreation.

The resulting changes in recreation services will further be compared with results from other models with respect to carbon sequestration and biodiversity (Jungandreas et al. 2015, in prep).

- Ref. Jungandreas et al. 2015. Trade-offs between Plant Biodiversity and Carbon Storage – Examples from Afforestation Scenarios in Saxony (in prep)  
 Sharp et al. 2015. InVEST +VERSION+ User's Guide. The Natural Capital Project, Stanford University, University of Minnesota, The Nature Conservancy, and World Wildlife Fund.  
 Wood et al. 2013. Using social media to quantify nature-based tourism and recreation, *Scientific Reports*. DOI: 10.1038/srep02976