“OpenEcoMap” – Crowdsourced Geospatial Data in Landscape Assessment Teaching – A Work in Progress

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Abstract

OpenEcoMap is an online map, which supports landscape planners during the analysis process. It shows data from the OpenStreetMap (OSM) database which is relevant for landscape planning projects. It has a special focus on data which is missing in official datasets. The crowdsourced data of OSM can be edited and used by anyone.

Projects in landscape planning always start with an analysis which contains complementary data from different sources. This can be official geospatial data from public authorities and data from one’s own field investigations. This paper describes a tool, which allows complementing data from one’s own investigations with open data from OSM. At the same time, the data stock of OSM becomes gradually completed. OpenEcoMap, some kind of “OpenStreetMap for landscape architects” is developed by the University of Applied Sciences Rapperswil (Hochschule für Technik Rapperswil, HSR). It is an online map based on the data of OSM, showing only data which complement the official data. OpenPOIMap is also developed by the HSR and allows downloading data from OSM in several formats to process them in geographic information systems (GIS) systems.

1 Introduction

This is a report on work in progress about an approach which includes crowdsourced open data and information technology (IT) in teaching landscape assessment in higher education.

SCOTT & HANNA (2012) state that geographic information systems (GIS) are widely recognized as useful additions to professional practice, but that there is a lack in GIS education. At HSR, it is assumed that GIS knowledge is a requirement in landscape architecture and other planning studies. The crucial point is how to make GIS easy and motivating to use (WEIBEL et al. 2011).

The official base data for landscape assessment does not contain all the information that is required for landscape planning, especially not for recovery planning. One of the elements of the approach is that students are complementing these official base data with open data from OSM. For example students practicing recovery planning can complement missing benches in OSM and provide it to the community without any additional work.

Wissen Hayek, U., Fricker, P. & Buhmann, E. (Eds.) (2014): Peer Reviewed Proceedings of Digital Landscape Architecture 2014 at ETH Zurich.
ISBN 978-3-87907-530-0.

Although there are tools for OSM data export available (KELLER 2012, MDL 2013), there is a need to extract specific objects for landscape planning out of the huge amount of OSM data and visualize it on a separate map, which is another element of the approach. This is effected by OpenEcoMap, the map for landscape assessment and recreation.

2 The OpenStreetMap Project

OSM is a project with the goal of creating a free map of the world. Volunteers from all over the world are collecting data and enter them in the OSM database. Mistakes are discussed and corrected, just like in other wikis. The result is a gradually growing map. The benefits of OSM are that the map is always up-to-date and that the data is free and can be used for further processing. Disadvantages of OSM are the missing guarantee of quality and correctness of the data as well as local differences in completeness (NEIS et al. 2013).

ERVIN (2012), HEWITT et al. (2012) and MANNL (2013) report about some applications of crowdsourcing. DRANGUSCH et al. (2012) found evidence that OSM data can complement official data. TONGWAY stated (2010) that the rapid conversion of raw field data into useful information is crucial. This is also where OSM data fits in well.

3 Requirements of Landscape Planning and Recreation Planning

The process of landscape planning projects widely takes the following form:

- Analysis (referred to special problems, such as recreation development),
- goal,
- concept, and
- measures.

The present work supports the analysis work. The analysis covers the assessment of aesthetics, the assessment of ecology and the assessment of usability (e.g. for recreation) (SCHÜPBACH 1999). Much data is available, but not, e.g., for recreation planning. The data for analysis can be found in different sources: Data for general plan presentation like elevation models, topographic maps, overview maps, surface coverage, aerial image, frontiers and so on are just like data concerning habitats and inventories available in high quality from public authorities. Large parts of the data concerning recreation are done as field work. Some datasets such as hiking trails or bicycle routes are available from public authorities. But there are no official datasets containing recreation infrastructure such as observation points, benches and fire places or cultural hotspots. Such data is captured in time-consuming field work. Often the data is used for only one project and then archived or thrown away. Here OSM offers great capabilities of storing the data which complement the official data and, at the same time, make it available to others. Data is captured once, but can be used several times by several planners.

In landscape planning, GIS are state of the art and more and more purchasers wish to get the processed data digitally instead of as a hardcopy (VON HAAREN 2004). The students of the HSR get a comprehensive training in GIS and landscape planning projects are done with GIS. Therefore the official data is complemented with own investigations.

4 OpenEcoMap

4.1 Use of OpenEcoMap

OSM data is often not used because the available maps – like the default map at the home page of OSM – does not show the data, which is relevant for a specific topic like landscape planning. The lack of visible data on these map styles enhances negligence of this carefully digitalized data source. Since the needed data could easily be downloaded using appropriate tools, this leads to redundancies and a loss of a data source.

With OpenEcoMap, a map style was developed which is based on the needs of landscape planners. The map is based on the data of OSM, but only the information which is important for landscape planners is shown. The online map can be accessed via any browser. In seconds, the planner knows if there is relevant information in the desired perimeter (see figure 3).

If some information is missing, users can edit the OSM map and shortly thereafter the data is visible in OpenEcoMap. By capturing data for OSM (typically using GPS or base imagery), students use it not only for the school-project but contribute information to the community at the same time, which is even more motivating.

With OpenEcoMap, the planner gets an overview of his perimeter. The planner sees if relevant data is available at one glance. If such relevant data does exist, it can be downloaded via OpenPOIMap and be used with any GIS or CAD system (see figure 1).

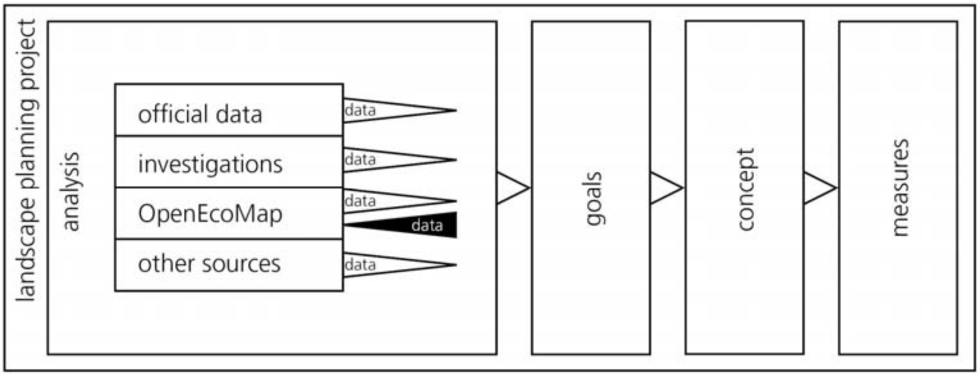

Fig. 1: Use of OpenEcoMap

The following elements are considered in the present work:

Attractions	Natural hotspots	Trees
		Waterfalls
		Erratics
		Caves
	Cultural hotspots	Lookouts
		Castles
		Botanic gardens
		Farms
		Chapels
Accessibility	Traffic Infrastructure	Train stations
		Bus stops
		Parking sites
Recreation infrastructure		Benches
		Playgrounds
		Fire places
		Picnic sites
		Fountains
		Open water access (swimming)
		Information points
		Toilets

Fig. 2: List of the currently shown elements in OpenEcoMap

These elements may be important to landscape planners during the planning process. At the same time they are not available as an official dataset. So this selection of objects can complement the official data of the federal office of topography and probably of other government data, too.

This list is not necessarily complete. After a trial phase of using the map in planning projects, OpenEcoMap can be adapted according to the feedback of the users. For example, it would be possible to show objects which interfere with the landscape or objects which can affect the recreation quality, such as power supply lines, wind generators, antennas, noise sources and so on.

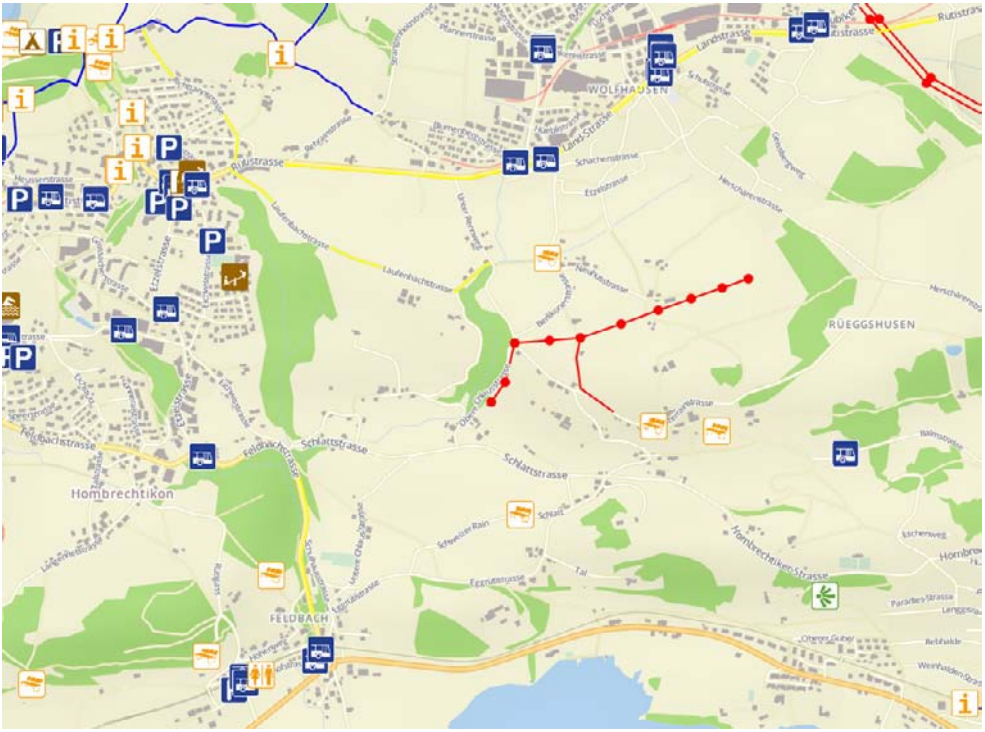

Fig. 3: OpenEcoMap: A web map based on OpenStreetMap data specialized for landscape assessment.

4.2 Data preprocessing

Because of its special data structure, the original OSM data have to be preprocessed geometrically and with regard to contents before they can be used with GIS. The transformation from closed (multi-)lines to polygons is the most elaborate one. Similar points of interests (POIs) have to be aggregated by transforming polygons (e.g. playgrounds) into points and by merging slightly different type names into generic terms (e.g. parking area). Eventually, the geospatial data is transformed into established GIS formats such as Esri Shapefile or as SQLite file, the new GeoPackage format.

The website openpoimap.ch is a service developed by the institute for software (IFS) in Rapperswil and is able to compute this transformation. OpenPOIMap downloads all the OSM data every day, stores it in a server and provides the download of this data in many different GIS formats. The downloaded data can be processed in any GIS.

4.3 Creating the map style

In addition to the advantage of OSM in editing the data, the map style can be defined as well, provided the corresponding infrastructure and knowhow. First of all, the map is split into two layers. Typically, there is a base map layer as a background and a POI layer, which consists of point data (markers), on top of it. There are several GIS tools to create individual map styles. Some of them are commercial products, others are open source. The map style is generated with the GIS tool under use of a configuration respectively a portrayal language. The language as well as the map style editor differs from tool to tool. An example for a common and free tool is TileMill. In TileMill, the map style is controlled by a „Cascading Stylesheet“, which is similar to the one used in web technology and therefore easy to handle for web developers. After this configuration and rendering step, the base map has to be preprocessed to tiles in order to use it as an interactive web map.

4.4 Conclusion

The main achievement of the work done in relation to this paper is clearly the implementation of the website. It is fully useable and shows the powerful possibilities that the concepts described throughout this paper grant. The thoroughly thought-out map legend further improves readability as well as usability. The groundwork, which made the realization of the website possible, was a sensible and consequent definition of POIs. Maybe the most important work, though, certainly with regard to the future, was the development of a concept on how to integrate OpenStreetMap for landscape architects in schools. On the basis of this concept, it is already used at the HSR.

5 Future work

“[…] IT has to be regarded as a technology that changes the way we understand and interact with the world” (BRUNS 2010). This report is a step in this direction. It concludes by referring to the work to be done, such as identifying OSM map features and establishing an active community. In addition, further improvements of the website as well as the integration into school modules belong to the biggest priorities.

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