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## New Opportunities for Highly Automated Countrywide Assessment of Trees Outside Forests in Switzerland

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Although various ways of defining forests exist, non of them is eligible on assessing every tree -growing outside forest- on the landscape. In the last decades, forestry and land management sectors have become increasingly aware that Trees Outside Forests (TOF) are critical non-forest tree resources to ensure environmental, economic, social and cultural services and functions. The importance of TOF varies in international, national and local levels. Recently, international programmes have been established to strengthen the services and functions of TOF: sustainable land management, carbon capturing and storage on climate change mitigation and improving local economies. Therefore, in the past years countries have started to take action for assesing their TOF resources on different scales.

Only little research has been conducted on TOF in Switzerland, yet the explicit spatial distribution of TOF in the landscape is poorly understood and their extent and tree biomass are unknown. Nowadays, remote sensing technologies have opened new opportunities to fill this knowledge gap, and countrywide data sets of TOF have become more feasible.

The present research aims to introduce a highly automated method to derive extent, spatial distribution and biomass of TOF in different land use classes: Agriculture, Urban, and Non-Agriculture/Urban for the whole of Switzerland.

The entire process of identifying TOF is done in Python using routinely acquired countrywide remote sensing data, i.e. Vegetation Height Model (Ginzler and Hobi 2015), CORINE Land Cover/Use map and the Forest Mask of Switzerland (Waser et al. 2015) and based on the decision tree algorithm developed by FAO-FRA (Foresta et.al., 2013). The primarily applied criterias are the Presence of Trees on the land, Land Use, and Spatial pattern of Trees. After the application of primary criterias, a set of thresholds were applied as following: the minimum canopy cover threshold: 5% (if trees only), 10% if combined cover is trees and shrubs, minimum area 0.05 ha., tree line lenght 25 m, and tree line width 3 m.

The present study aims to complement forest data obtained from the Swiss National Forest Inventory and enables to derived relevant TOF parameters such as tree species distribution, biomass and carbon sequestration potential. Moreover, the proposed method is relevant to help other countries to create their own data sets on non-forest tree resources as an input to energy,

environment, forest policy making, and wood industry decision making and to contribute to better cope with the challenges of changing climate and environment. Currently, the potential of Sentinel-2 imagery is being tested.

Keywords: Trees Outside Forest, Wall-to-wall, Vegetation Height Model

Reference: Hubert de Foresta, Eduardo Somarriba, August Temu, Désirée Boulanger, Hélène Feuilly and Michelle Gauthier. 2013. Towards the Assessment of Trees Outside Forests. Resources Assessment Working Paper 183. FAO Rome.

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