

IO1: Introduction

Introduction

A marteloscope is commonly defined as “an area of forest where all the trees are mapped, numbered, measured and classified” (Soucy et al., 2016). Data recorded from marteloscopes are frequently used in forestry training, typically by proposing virtual management interventions supported by software tools (Kraus et al., 2018). In addition to the use of “virtual marteloscopes” in the classroom, field visits to the actual marteloscopes can be a helpful training complement (Soucy et al., 2016). This possibility of combining and linking learning activities that happen both in the virtual and physical versions of the marteloscopes may generate interesting opportunities for the so-called “Ubiquitous Learning” (Jones & Jo, 2004). Different ICTs facilitate the seamless connection among learning activities that happen across different physical and learning spaces.

One recurrent technological approach for supporting Ubiquitous Learning is the combination of mobile devices (smartphones, tablets, ...) and Augmented Reality (AR), that allows the overlapping of virtual information in a physical environment (Azuma et al., 2001). Using a smartphone and an AR app, forestry engineer students might, for instance, visualize data and reports prepared at the classroom, when scanning an AR marker positioned on a specific tree at a physical marteloscope. Or the contrary, a student might find, when browsing a virtual marteloscope at the classroom, data that was collected by this (or another) student during a field visit to the marteloscope and registered “in situ” using an AR app. This approach opens new teaching and learning possibilities based on an already available resources (marteloscopes) using common technological tools (mobile devices and AR apps). However, setting up and managing learning situations that make use of this technological components can be very demanding for both teachers and students (Muñoz-Cristóbal et al., 2014). To overcome this challenge, the VirtualForests Strategic Partnership aims at applying existing technological solutions for (easily) designing and setting up Ubiquitous Learning situations, successfully employed in other domains (Muñoz-Cristóbal et al., 2015; Muñoz-Cristóbal et al., 2017), to the case of physical-virtual marteloscopes. VirtualForest will illustrate and evaluate this technologyenhanced learning approach, also producing a set of learning scenarios that could be reused in different marteloscopes and in the context of different Forest Science and Forestry Engineering curricula.

For each of the marteloscopes a complete set of virtual tours will be created. In the BioEcoN project a set of virtual tours were created, published and tested with the master’s program students. The academic results were very satisfying. The virtual tours were hosted on the central informatic servers of the University of Valladolid and University of Eberswalde (<http://bioecon.eu/virtual-forest-tours/>; <http://sostenible.palencia.uva.es/content/virtual-forest-tours>). In the present project the virtual tours will be published using free software and free use servers of broad use like google maps or poly. The goal of preparing materials to be used in platforms of common use is to allow a broader and faster worldwide access to the virtual tours, either on PC or smartphone. The use of popular web mapping services (i.e. google) will contribute enormously to the worldwide extension of the project. This IO will be cross-fertilized by other similar initiatives by our associated partners as the sylvotheque

(www.sylvotheque.ch) to gather additional innovative ideas. In the current context of global change, learning about sustainable forest management must take into account the biological and functional diversity of forests. One of the strategies that can be developed in the marteloscopes is to make alternative proposals for forest management and evaluate their impact on biodiversity. This would allow the design of sustainable use strategies that provide income to the local population while promoting the conservation of biodiversity, as indicated in the United Nations Sustainable Development Goal 15 (United Nations 2015).

To make the right decisions, it is necessary to assess the economic value of each tree and its value for biodiversity. The value for biodiversity can be analyzed with the TreMs (Tree Microhabitats) framework, which is defined as indirect indicators for the species that use them as substrates or habitat for at least part of their life cycle (Larrieu et al. 2018; Santopuoli et al. 2019, Segalina et al 2020). These include cavities, wounds, dead wood, and other features as significant bioindicators of the tree's habitat value. Through virtual visits, the value of habitat and the economic value of trees can be analyzed.