



## Using a Virtual Globe approach in teaching soils and soil degradation

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Soils are crucial to sustain our lives and therefore their origin, use and potential vulnerability are important to understand. Any graduate in an education program focusing on the “Earth’s Critical Zone” should have a basic understanding of soils. We present here an instruction lecture, which is developed for the bachelor programs Earth Sciences as well Future Planet Studies as taught at the University of Amsterdam. The aim of the instruction lecture is to 1. improve learning efficiency by interactively illustrating concepts of soil formation and soil degradation on the Virtual Globe and 2. recognize their spatial distribution in a Virtual Globe environment in which known point information on soil (profiles) can be studied in their spatial context. When using historic imagery, (change in) landscape and land-use patterns can be studied in relation to soil development.

We developed the instruction lecture within Google Earth and use this in a studio class room where presentations and additional non-digital techniques or experiments can be combined. We selected a case study from SE Spain, where field data are combined with remote sensing imagery and (historic) aerial photography, as well as thematic maps and other background information. This information is stored in .kmz files, which can be opened in Google Earth. Questions and assignments have been included, pinned to specific sites, landscape cross sections or regions of interest. These assignments have to be finished during the session, but can also be interactively be discussed in the classroom with the whole group of students. Such an approach can also be implemented within the preparation of field classes, which potentially improves learning efficiency. This is also important as field classes are more and more perceived as expensive, resulting in an increased pressure by the educational management to reduce in field classes. Also outcomes of research or field classes can be connected to the system by which a digital knowledgebase is built up, directly coupled to the soils geographical environment.

The big advantages of the approach presented here is that 1. Virtual Globe environments connect more to the modern mind-set of students, 2. Point data can be directly coupled to the 3-dimensional regional setting using image drapes over a Digital Elevation Model rather than only numbers or isolated sketches, 3. Integration of knowledge from different fields, such as geomorphology can be easily achieved, 4. Didactical goals on expanding knowledge to understanding and application can be achieved, 5. A far better understanding of field-sites prior to field classes or field research can be achieved, 6. It allows for building up a knowledgebase if applied in a field research context, and 7. Soils science, but also other disciplines like geomorphology, can be educated in a more modern, appealing and effective way.