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(eds.)

RETOS Y OPORTUNIDADES EN LA CIENCIA DEL SUELO



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International collaboration for soil conservation teaching

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Abstract

This contribution summarizes the main activities carried out in two Erasmus Intensive Programmes involving five Universities from France, Hungary, Greece, Italy, Portugal, and Spain for six years. In each year a group of 25 students and 6 teachers participate for 15 days in different interactive teaching activities related to soil conservation. Different issues were taught and discussed in international collaboration. The main outputs of this collaboration teaching were interactive exercises and two handbooks.

Introduction

In the past decades there has been an increase in the number of projects, and publications and an overall increase in the demand for soil science expertise. Student numbers have also risen in many soil science departments and universities (Hartemink et al 2008). The special traits of our scientific discipline require a particular way of teaching. Given the rapid changes in soil science, teaching and learning methods require a continuous update to deliver graduates who are equipped with the right skills for the jobs that are available. Much of the teaching in soil science takes place for a wide and diverse student audience. Many of these students never intend being soil science professionals but there is an opportunity to impress upon them the importance of understanding soil properties and conservation within their discipline (education, geology, agriculture, geography). In addition, the international perspective of learning is necessary to prepare the future professionals to work in complex projects. Such teaching requires new ideas how to teach soil science in a changing world that demands specific as well as diverging expertise from our graduated students. The objective of this study was to create collaborative synergies for improving the teaching of soil conservation.

Material and methods

The activities were carried out in the frame of two Intensive Erasmus Programmes (UE), Soil Protection in Sloping Mediterranean Agri-Environments (2009-2010) and Run off Erosion (2012-2014), funded by the National Agencies of Lifelong learning Programme-ERASMUS in Portugal and Greece, respectively.

The courses were focussed for graduate and postgraduate students of agriculture, geology, biology and geography. These two projects were designed as ‘hands on’ programmes, comprising theoretical background together with a strong component of application exercises (computer, field and laboratory work) and field trips. All subjects follow the sequence theory, application exercises and discussions. Independent work is stimulated, either in classroom or tutored, during and after course. Remote assistance is provided by teaching staff, through e-learning tools, especially but not exclusively for final report writing. Actually, and in line with the Erasmus operational objectives, ICT are intrinsic to the programme, as an on-line

part of the course available in English, in partial fulfilment of the general expected result of progressing towards a specifically oriented training transnational platform. Lectures and all working material, and evaluation were in English.

The courses were carried in Portugal, Greece and Spain. The presentations of the respective countries were given not only by teachers but also with the collaboration of students. The field trips addressed the main aspects to preserve the soil and waters in different cases, such as urban lands, coastal areas, dunes, intensively managed plantations and agricultural soils. Practices in the GIS laboratory were implemented to understand the main models on soil erosion. Advanced laboratory practices were aimed to use radiocarbon and Optically Stimulated Luminescence OSL were useful tool for reconstructing colluviation processes.

Results and discussion

Four main blocks were established:

- i) general soil properties: During the course the students learned the general properties of soil from the Mediterranean Europe. The influence of different factors of soil formation, such as bedrocks, climates, plant cover, topography and time were studied.
- ii) mechanisms and factors of soil and land degradation: To understand the main processes of erosion and soil conservation specific lectures, practices in class and field were designed. The relationships between soil porosity, soil hydraulic properties and run off.
- iii) laboratory and field techniques to measure the current and geological soil erosion. Field measurements and experimental simulations were carried out. Radiocarbon and optically stimulated luminescence dating was applied for dating slope deposits.
- iv) models for estimating soil erosion were considered. Practices with both empirical and physical models were carried out. Different applications of Geographical Information Systems (GIS) were taught.
- v) General and specific techniques to control erosion in managed soils were showed. The effect of management and intensive perturbations were discussed.
- vi) Study cases. The study cases included examples of agricultural soils (Portugal, Greece and Hungary), vineyards and oliveyards (in Portugal and Greece), agroforestral systems (Italy), intensively managed forest soils (Spain), wildfires (Portugal, Greece and Spain), coastal erosion (Greece). Attention was also paid to abandoned lands, which was identified as one of the main problem in the Mediterranean region.

Interactive exercises to favour in international collaboration between teachers and students of different countries and backgrounds were developed. Two handbooks, *Soil Protection in Sloping Mediterranean Agri-environment_Lectures and exercises*, and *Run off Erosion*, were published.

References

Hartemink, A.E., McBratney, A., Minasny, B., 2008. Trends in soil science education: Looking beyond the number of students. *J. Soil Water Conserv.* 63, 76–83.