

## **Grassland Vegetation and Management - on the Interface between Science and Education.**

From the experience of a romanian-swedish-german Intensive Program within the framework  
of ERASMUS - Lifelong Learning

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**Abstract.** The concept and implementation of a tri-national EU intensive Programme (IP) is presented and discussed. The objective is to improve the methods employed by the teachers and scientist of the staff concerning the classification and management of grasslands to students and to prepare them to be able to design, analyse, and evaluate grassland management strategies and to understand grasslands in land-use-system terms. The focus lies on the development of strategies for sustainable grassland use in the context of regional development.

The innovative character of this romanian-swedish-german module is exemplified.

**Keywords:** Grassland interdisciplinary course, ERASMUS-LLP, IP,

### INTRODUCTION

Grassland and vegetation classification and evaluation is a basic requirement for selecting site-adapted management techniques for sustainable agriculture as well as for restoring sites and landscapes or for adapting grassland ecosystems to climate change. This is a subject that tackles both - an interdisciplinary and holistic approach.

Since 2009 an international, interdisciplinary project with the topic “*Classification, Evaluation and Management of Grassland in Europe*” (CEMGE) is carried out in the framework of the Lifelong Learning Programme (LLP) with funding of the EU.

Project partners are:

- University of Freiburg/Germany, Institute for Landscape Management
- University of Agricultural Sciences and Veterinary Medicine (USAMV) Cluj-Napoca
- Swedish University of Agricultural Sciences (SLU) Uppsala, Swedish Biodiversity Centre (CBM)

The project consists in a 2 weeks long summer-school organized during three consecutive years (in august 2010, 2011 and 2012 respectively) in each of the participating

countries. Although the third year of the project will be implemented in 2012, we can already make some remarks and statements to the past summer-schools and comment their impact and added value.

## IN THE CONTEXT OF LLP AND ERASMUS IP PROGRAMMES

The general objective of the EU-Programme Lifelong Learning is to foster the interchange, the cooperation and mobility between education and training institutions and systems within the European Community, to help improve their quality, to promote high performance and innovation, creativity and competitiveness (Lifelong Learning Programme, General overview, Guide 2009, <http://ec.europa.eu/llp>). One sectoral programme of **LLP** is the ERASMUS Programme, which enables mobility and cooperation in higher education across Europe. In addition, Erasmus supports higher education institutions to work together through the sub-programmes: Intensive Programmes (IP), networks and multilateral projects (Lifelong Learning Programme, General overview, Guide 2009, <http://ec.europa.eu/llp> ).

An Intensive Programme (**IP**) is a short programme of study which brings together students and teaching staff from higher education institutions of at least three participating countries for a short defined period of time (from 10 continuous full days up to 6 weeks). It aims at:

- (1) encouraging efficient and multinational teaching of specialist topics;
- (2) enabling students and teachers to work together in multinational groups and benefit in this way from special learning and teaching conditions not available in a single institution, and to gain new perspectives on the topic being studied in an international classroom environment;
- (3) allowing members of the teaching staff to exchange views on teaching content and new curricula approaches. Special effort is made to recognise the workload of the participating students through ECTS (or otherwise equivalent) credits by all participating institutions of higher education.

From the beginning our project *CEMGE* was oriented on the main objectives of the Intensive Programmes guidelines. These are:

- To improve the quality and to increase the volume of student and teaching staff mobility throughout Europe;
- To improve the quality and to increase the volume of multilateral cooperation between higher education institutions in Europe;
- To increase the degree of transparency and compatibility between higher education and advanced vocational education qualifications gained in Europe;
- To facilitate the development of innovative practices in education and training at tertiary level, and their transfer, including from one participating country to others;
- To support the development of innovative based content, services, pedagogies and practice for lifelong learning. (ERASMUS Programme, [http://ec.europa.eu/education/lifelong-learning-programme/doc80\\_en.htm](http://ec.europa.eu/education/lifelong-learning-programme/doc80_en.htm)).

In addition some other objectives set out in the European priorities of the programme were implemented, like:

- To give evidence Give evidence of full recognition and credits to the activities by the participating institutions;
- Present a strong multidisciplinary approach.

## PROJECT BACKGROUND AND SITUATION IN THE COUNTRIES INVOLVED

Grasslands are a dominating plant formation in all European countries forming large parts of the cultural landscapes. They are characteristic elements of land use systems and household economies shaping the traditional rural landscapes. They provide pasture and produce hay, and are habitat for rare and endangered species - several of them protected by NATURA 2000. Grasslands are important for production, nature conservation, and landscape aesthetics. The understanding of their functioning and management demands the inputs of several disciplines. Our proposed *CEMGE*- Intensive Programme requires therefore from the start a multidisciplinary approach.

At present, economy-driven drastic changes of grassland utilisation occur nearly everywhere, resulting in an intensification of uses on favourable sites, a decrease of biodiversity, and an eutrophication of soils; and on less productive unfavourable sites in abandonment, succession, and reforestation. It can be expected, that large areas of grassland on marginal land will return to forest in the nearby future. On the other hand we have costly management of grassland habitats for nature conservation purposes.

Decisions have to be made, which regions and grassland types will need special care in the future, which should be afforested, or left to natural succession. At the same time their value regarding landscape elements and cultural heritage must be known. These decisions require knowledge about the site characteristics, the grassland vegetation and fauna. The economical status and importance of grassland should not be neglected. Therefore the analysis and discussion about the long term survival of grasslands would contribute in raising the awareness of different status of grasslands in different parts of Europe. Disciplines involved are pedology, climatology, vegetation science, ecology, socio-economy, landscape history, landscape management, agronomy.

Classifications and even more evaluations have a natural and a human component. In terms of classification of grassland, we have to take into consideration the abiotic environment and the human impacts (grazing, mowing, fertilising etc.) and other land-use systems. Accordingly we have to apply methods of vegetation science, agronomy, field pedology, meteorology. The value of the grassland types for production and environmental services differs. The evaluation of cultural landscapes with grasslands follows other criteria. For the evaluation disciplines like agronomy, economy, landscape management and landscape history, nature conservation are essential. The classifications and evaluations of European grasslands provide a base for further management and conservation decisions.

Knowing about the site demands of grassland species and vegetation types; their interrelation with the specific management techniques (including grazing, mowing, fertilizing); and the criteria and indicators of (economical and ecological) grassland evaluation will be a key competency for agronomists, ecologists, landscape planner and environmental decision makers of the next generation.

Our project “*Classification, evaluation, and management of grassland in Europe*” (*CEMGE*) – Intensive Programme responds to the needs and challenges emerging at European level since:

- Grassland classification is basic to know the differences in grassland species composition and structure
- Grassland evaluation is basic to utilize and preserve these habitats.
- The knowledge of appropriate management techniques is essential for the maintenance of grassland.
- The knowledge of land-use systems in grassland areas gives the possibility to evaluate their importance for the cultural landscape and to discuss the perspectives and long-term survival of grassland in Europe.

The continued utilisation and conservation of grassland is a shared challenge for all Europeans. The situation of grasslands in each of the participating countries is quite different. In some regions and countries with mild, humid climate, dairy production may continue to prevail. In regions and countries with unfavourable climate and soil, increased efforts are needed to preserve the existing grassland. Different approaches of grassland management and maintenance were developed in the three countries involved: Germany, Romania and Sweden. This raises common concerns and teaches lessons from which we should learn for the future in order to maintain our cultural landscapes and their biodiversity. Working in three national groups fosters a better understanding and a deeper respect of the different cultures within students as well as teaching staff.

## PROJECT AIMS AND STRUCTURE

The running IP-course - on the interface between science and education - integrates modern results and basic techniques of scientific research with methods and concepts in teaching about grasslands in order to promote a common understanding about grasslands utilization, management and conservation in Europe.

The *overall objectives* of the project are to introduce, develop and harmonize the teaching in the field of grassland ecology, land-use and landscape, biodiversity and conservation, cultural heritage (see Univ. of Freiburg, Institute for Landscape Management - Application form 2009 for Intensive Programmes IP). This includes:

- a.) compiling the present state (methods, extension) of grassland classification, utilization, and evaluation in Europe;
- b.) defining the terms and definitions being used;
- c.) developing a common curriculum and providing basic elements for education of students in universities;
- d.) finding and testing the adequate combination of teaching methods for students learning grassland ecology, utilization techniques, and evaluation.

*Specific aims* of the pursued course are:

- a.) to introduce in theory and methods for the collection and analysis of grassland vegetation, site, landscape elements, productivity and management data;
- b.) to know how to collect or obtain these data for different grassland types;
- c.) to analyze the relationship between site, vegetation, fauna, land-use techniques and socio-economic outputs.
- d.) to aggregate these parameters (e.g. relating grassland types to sites, management, and economical and ecological value);
- e.) to identify and recognize the particularities and the values of the grasslands in the explored countries and put them into the European context.

At the participating institutions this running IP Programme is designated as an “elective module” for senior undergraduate and postgraduate students (MSc and PhD) but also opened for Bachelor students. This is one of the particularities of this concept: to be open to all levels of graduation (BSc, MSc PhD) in order to realize the direct interaction and transfer of knowledge between the different student levels (not only from staff to students) in the higher education system. As far as we know, it is the only EU education project where this is possible.

Concerning the structure each summer-school consists of two components: (1) a two-weeks course phase with lectures, excursions and field work in groups (supported by EU funding) and (2) a week of wrap-up phase: preparation of a short individual contribution on a selected topic.

At the beginning of each summer-school the staff taught about the theoretical background of the topic. The teaching program introduces to the grassland flora and fauna; to

the particular landscape elements; to the principles of grassland classification, utilisation, evaluation, and comparing the different methods used.

In the second week the students applied problem-based team projects to real-field situations starting with the design of the project, selection of the right methods, data collection and data analysis ending with discussion and evaluation. During the fieldwork, tri-national teams were formed, with at least one student from each university. These intercultural groups worked independently under the supervision of a teacher and prepared their presentation for the final workshop, which represents the synthesis of the students' work and the highlight of the summer-school. Evening lectures complemented the knowledge about the particular situation of grassland in the respective host country

Traditional disciplinary approaches of learning and research are mainly effective at identifying cause-effect relationships; this knowledge is being placed in a broader systematic context. In the course we incorporate problem-based team projects on real-world situations as a means of providing students with integrative and meaningful experiential learning. Until now, no equivalent teaching module exists, because the combination of several disciplines is challenging and combines theory and practice (data collection, analysis, evaluation, modelling). In this consists the innovative character of the teaching programme.

We wanted to sensitise the students (and lecturers) with respect to the consequences of intensification or other changes of utilisation; of abandonment, succession and afforestation; of the endangerment of grassland species, habitats, and landscapes on unfavourable sites. Problems concerning the interdependence between traditional land use and biodiversity as well as aspects of the cultural landscape and the rural heritage were considered.

## RESULTS FROM THE SUMMERSCHOOLS IN 2010 AND 2011

In august 2010 the summer-school took place in Romania, in Cluj-Napoca at the office of USAMV and in the Apuseni Mountains in the village of Ghetari. Tab. 1 figures the topics of the courses/lectures and the topics of the field work/workshop presentation.

Tab. 1

Topics of the lectures and presentations treated in the summer-school 2010 in Romania

<b>Topics of the lectures (staff)</b>	<b>Topic of the group fieldwork (students)</b>
Grassland as ecosystems (Prof. Rotar)	Site conditions and vegetation of a doline (in a transect)
Grasslands in the agricultural system. European grasslands: status trends and economy (Dr. Anna Dahlström)	Multi-functionality of landscape elements – past, present and future
Management and biodiversity of grasslands (Dr. Păcurar Florin)	Influence of fertilisation (organic and mineral) on biodiversity and soil properties.
“Reading the landscape” – historical analysis of grassland development (Dr. Franz Höchtel)	Interrelation between tree management and other land uses
Classification of the grasslands from Romania (Prof. Rotar)	Openness and floristic composition in pastures – transect from the open land to forest
Presentation of the research projects in Ghetari from the last 10 years; Proiect Apuseni (Dr. Evelyn Rusdea)	How political and socio-economic changes have affected daily life and land use in Ghetari

Secondary aspects were carried out during field excursions and visits – for example to the Experimental farm near Turda, to the salt vegetation in Băile Durgău (near Turda), to

drainage meadows in Arieșeni, to the high pasture in Călineasa and the carstic phenomena in Ocoale Plateau (see Univ. of Freiburg, Institute for Landscape Management – final report for the beneficiary 2009/2010 for Erasmus Intensive Programmes IP - unpublished).

In august 2011 the summer-school took place in Sweden, in Uppsala at the office of CBM and in the village of Bråbygden in Småland. In Tab. 2 the topics of the courses/lectures and the topics of the field work/workshop presentation are shown.

Tab. 2

Topics of the lectures and presentations treated in the summer-school 2011 in Sweden.

<b>Topics of the lectures (staff)</b>	<b>Topic of the group fieldwork (students)</b>
Introduction to Sweden, climate and vegetation (Dr. Roger Svensson)	Influence of former management on biodiversity - Changes in tree- and bush cover and vegetation from the 1930ies to 2010 with the help of aerial photographs, photos and field work.
Swedish history and effect on present grassland biodiversity (Dr. Anna Dahlström)	Is the present biodiversity a mirror of the past grassland management? Does the biodiversity differ in the present pastures depending on historical management (18th century and 1930)
Swedish grasslands: dry meadows (Dr. Mårten Aronsson). Swedish grasslands: wet meadows (Dr. Roger Svensson).	Vegetation changes in Bråbygden during the “late history” (1980 - 2011) - Follow up of the floristic composition and biodiversity
Romania and traditional grassland management (Dr. Florin Păcurar, Dr. Andrei Stoie)	Vascular plant species diversity and grassland use – extensive and intensive or other variable
Introduction to grassland ecology and management in Germany/Central Europe (Prof. Dr. Albert Reif)	Trees on grassland – tree species, tree use ecology and landscape elements
Overview for studying vegetation, methods (Prof. Dr. Albert Reif) Nature conservation values of grasslands(Prof. Dr. Albert Reif)	Socio-economy and landscape change
Grasslands in Europe (Prof. Dr. Urban Emanuelsson)	
Overview of the summer-school 2010 - Experiences from Romania (Dr. Evelyn Rusdea)	

Other aspects concerned the Linnean heritage in Uppsala (Linnaeus Garden) and near Uppsala (Linnaeus’ Hammarby), the grassland in the Uppland coast near Osthmmar (Nature reserve Havsvik - wooded pasture), the meadows in Hallsta ängen (Nature reserve). A special field excursion was organized to the carstic island of Øland – the sandy vegetation and the limestone barren plain Great Alvar (UNESCO World Heritage Site)..

Beside the common approach (lectures and fieldwork in groups), every student had to prepare an individual paper to a selected topic as a contribution for the final booklet (see Outputs and dissemination). The topics were fixed in advance by the teachers’ staff. The papers must relate to grassland according to the delimited subjects and contain a general introduction and some examples using references, scientific literature and other sources of

information. Own reflections and discussions are very welcome and enable the possibility to present an individual angle, according to the personal experience of each. A first draft should be brought to the summer-school in order to get a preliminary feed-back from the other fellow students and from the teachers. The final document should contain some reflections about the new experiences during the course and the situation of grassland in the visited countries.

## OUTPUTS AND DISSEMINATION

The central output of the course will be an electronic booklet placed on the web after the last year of the project. (at the end of 2012). This brochure contains information about aims, methods, practical approaches, and examples of results (“case studies” during three years of the IP). Didactic and teaching aspects as well as aspects of grassland classification methods will be covered.

The compiled teaching material produced for and during the project (individual papers, as well as the presentations of the students and the teachers) will be accessible in the web. The designed Curriculum for grassland classification can be considered for practical implementation at the three participating universities or/and other future partners - the underlying idea was to develop and harmonize the teaching in the syllabi of the participating universities.

All outputs are written in English (the official language of the course) ensuring the worldwide dissemination and available for free on the internet.

## ADDITIONAL BENEFITS AND IMPACT

The distinctiveness of this Intensive programme (a series of summer-schools) with a grassland topic is the interdisciplinary and intercultural approach. The mix of methodologies combining theory with practical field work in small, mixed, cultural groups covering a broad spectrum of subjects within the context of landscape integration is very innovative. The students’ contributions in the booklet reflect the intention of the summer-school – and its three pillars - classification, evaluation and management of grasslands.

Increased ability and knowledge of the students (and the teaching staff) is another benefit/output of this project. The students have learned by themselves and from each other to formulate research questions; to define adequate methods for collecting and analysing the data, and to present their results. The didactic approach applied develops simultaneously both: problem solving strategies and disciplinary knowledge bases and skills by placing students in the active role of problem solvers confronted with real actual grassland issues.

In the group work beneath the scientific skills also soft skills (social competence, communication, presentation) and language skills were practised. To ensure that the participating students benefitted from the skill-based field learning, and to facilitate closer personal contact, the groups during field work were limited to 5-6 students, coming from all three participating countries. To develop and strengthen complementary skills, all members of a group were actively involved in the final workshop and everyone had to present something during the power-point presentation.

The individual benefit for all participants of this course consists in the introduction of new ways to tackle the problem domain through this intense tri-national collaboration, new transnational cross-cultural dialogues and sharing of experience and best practice solutions.

After this positive experience of working together, the three universities involved have discussed further research collaborations, with the idea of strengthening their institutional network.

Regarding the impact of this Intensive programme we must distinguish two levels: one of the teachers and the other of the students. The main impact on the teachers' level was, that all teachers/researchers were "forced" to communicate and find a common approach to assess grassland issues. It was really impressive to see how the knowledge and experience of the lecturers involved is complementing one another.

The main impact on the students was that they have understood the complexity of interactions in grassland ecosystems, and the interdisciplinary classification and evaluation. Profound knowledge about grasslands and their value (including to the cultural heritage) enables people to assess land use in other landscapes using related methods, e.g., in agricultural landscapes.

### IMPORTANCE OF THE IP-PROGRAMME AND CONCLUSION

This joint project (embodied at the Intensive Programmes (IP) of the LLP) fulfils the principles of the ERASMUS Policy Statement of the Universities of Freiburg, Cluj-Napoca and Uppsala.

The cooperation between the three countries contributes to a) the development of an international dimension for studies within a globalized scientific and economic area; b) follow innovative proposals concerning the academic community; c) construct bridges within European countries; and d) promote innovative research by creating or participating in European and International networks, and by achieving accreditation of its research services and laboratories.

The possibility of intra-European mobility for teaching staff and students helps to forward the adaptation of the members of the university community. On the other hand it promotes the adjustment of the curricula to the current levels of scientific progress and the development of mechanisms for the incorporation of new scientific knowledge. Furthermore, this kind of project contributes to the implementation of innovative and flexible curricula, which can adapt to the rapid changes and increasing needs of the labour market. The Intensive Programme facilitates the convergence of studies with respect to the quantity and quality of knowledge and skills that represent the different levels, certifications and qualifications, and the development of competitive human resources in the European area of education.

With this IP, a common European education area is promoted and contributes to the increase of quality of the teaching staff and student mobility. This is achieved through common work and exchange of teaching staff, students and experiences. Additionally, the cooperation of three higher education institutions from three different countries improves the quality and increases the volume of multilateral cooperation, promotes the development of innovative practices in education and their transfer, since it targets the development of a common curriculum in grassland ecology and management, and the development of common teaching materials.

Let us finish with a final personal remark: each summer-school was a unique event, because the people involved, who probably will never meet again in such a setting. All in all it fostered a better understanding of and a deeper respect for the different cultures. The intrinsic potential of the group (students and staff) was really remarkable and for all

participants a quite special experience, which we can recommend warmly. There is so much potential in this relatively unknown Intensive Programmes in the Framework of ERASMUS EU-funding.

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