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A winter school in landscape agronomy and the synergies it created

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Abstract: We present the experience of the second Winter School in Landscape Agronomy (WSLA) for PhD students in agronomy developed by a French-Italian team of researchers with various backgrounds but all working in an agronomical context which requires a landscape scale vision and concerns agro-environmental and territorial issues. The lack of a common language became evident and all researchers recognised that contributions from different disciplines (agronomy, geography, landscape ecology, land management, etc.) could contribute to the development of an appropriate research methodology for the specific research questions. Hence a common conceptual framework was developed and a concepts and tools "glossary" was defined. The efficacy of the framework and glossary to help communication in Landscape Agronomy issues was tested through 1) application of the framework in the development of the WSLA and 2) by looking at the capacity of the framework and the glossary i) to guide the students through the concepts of Landscape Agronomy and ii) to help them in defining questions regarding the case study. In this paper we present some scientific and educational issues that are involved in the WSLA; we present the conceptual framework developed for the WS, and we show its place in the educational programme. We elucidate the innovative aspects added to the educational curricula of the students that participated and highlight the created synergies. For teachers, this new approach helped to better structure the WSLA programme; for the students, it made it easier to position new knowledge and to give structure to the case study work.

Keywords: landscape, territory, agronomy, interdisciplinary, stakeholders, education, action research

Introduction

Conceptual framework of the Winter School in Landscape Agronomy

The Winter School in Landscape Agronomy results from the involvement of the authors of this paper as supervisors in a PhD thesis on agro-environmental functions (Marraccini et al, 2008). All researchers and professors of this French-Italian team have various scientific backgrounds although they all work in an agronomical context which requires a landscape scale¹ vision and concerns agro-environmental and territorial issues. The lack of a common language became evident and all recognised that contributions from different disciplines dealing with agronomy and landscape issues (agronomy, geography, landscape ecology, land management, ...) could contribute to develop an appropriate methodology for the specific research questions (Benoit et al., 2009). Hence a common conceptual framework was developed and a concepts and tools "glossary" was defined. A very first attempt to define such a common framework was presented and used for the first time in 2007 during a newly developed Winter School in Landscape Agronomy (WSLA) for PhD students at the Scuola Superiore Sant'Anna of Pisa (Rapey et al., 2008); it was then refined and was better integrated

¹ i.e., local scales up to LAU3 or NUTS2 European classes of administrative regions (http://ec.europa.eu/eurostat/ramon/nuts/home_regions_en.html).

into the second WSLA held again in Pisa in 2009. This conceptual framework (Fig.1) represents the variety of agronomical questions requiring a landscape scale vision and is made up of three poles. Each pole corresponds to one of the core areas that support this type of agronomical research. The interactions between the poles represent the type of research questions or management and planning issues that involve these core areas of research. The three poles are: farming practices and systems (as part of broader land management practices and systems), agro-environmental processes (as part of broader ecological, physical and chemical processes), and agricultural land use patterns (as part of broader land use patterns). The components of each of these poles can either be resources or constraint driving the state or dynamic of one of the other poles (for example, crop and adjacent field margin management contribute to agricultural land-use pattern; erosion due to agricultural land use patterns may influence in turn cropping practices). The nature of these interactions can be read and interpreted at different temporal, spatial and social levels (e.g. season/year/generation time spans, field/farm/ landscape scales, farmers/land-users associations/local authorities organization levels) and this will influence the interpretation of the studied phenomena.

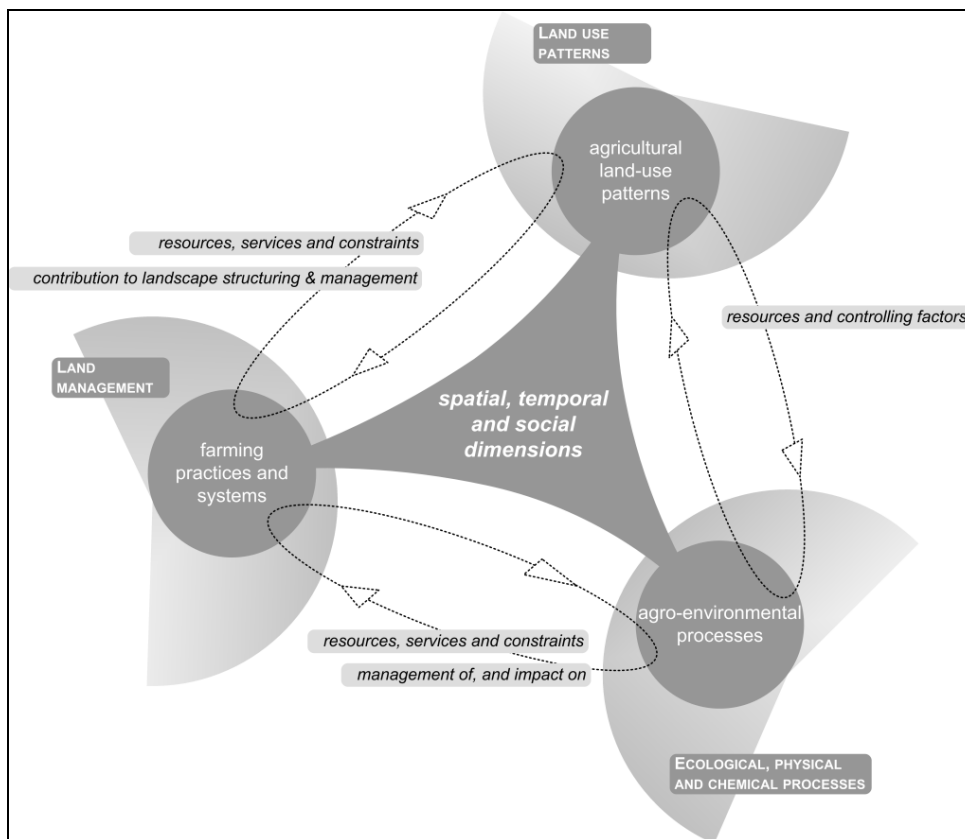


Figure 1. The conceptual framework defining the field of landscape agronomy (with thanks to Davide Rizzo and Elisa Marraccini for graphical lay-out and their contribution to the definition of the used terminology).

A common feature of all these research projects is that they evolve around local stakeholders' questions and locally defined agro-environmental problems. Therefore, most of the research can be classified as research for action *i.e.* research contributing both to finding innovative solutions for real problems in collaboration with local stakeholders, and developing generic concepts and methods for the understanding of processes and design of systems (some of the approaches belong to 'action-research'²).

² Action research is "a comparative research on the conditions and effects of various forms of social action and research leading to social action" that uses "a spiral of steps, each of which is composed of a circle of planning, action, and fact-finding about the result of the action" (Lewin,1946)

This characteristic has been transferred to the WSLA and it is for this reason that the case study work takes a central place in the WSLA. Both for scientific and educational reasons it was decided to concentrate the case study within an existing PhD project. This has the advantage that a bulk of basic knowledge is readily available to the WS students and at the same time it gives the opportunity to the students to get involved in a real problem. This increases complexity but shows the importance of an interdisciplinary approach and involvement of local stakeholders in order to get closer to a complete analysis of the agro-environmental issue and to possible solutions for sustainable management or planning of rural areas. At the same time, this gives the opportunity to the PhD student involved in the project to participate in the WSLA as a case study tutor, to have an experience in education in landscape agronomy, and to have a refreshing look at his/her study area.

Objectives of the paper

In this paper we present the experience of the second Winter School in Landscape Agronomy (WSLA) which was based on the conceptual framework for analysis of interactions in the field of Landscape Agronomy (Fig.1). By analysing the changes in agronomical research issues we observed a need for new approaches in agronomical education programmes. This resulted in the establishment of a WSLA jointly set up and conducted by a French-Italian team of researchers. In this paper we describe the scientific developments that caused us to set up such a winter school, present the methodological basis of the educational programme, show the innovative aspects added to the educational curricula of the students that participated and finally highlight the created synergies.

Results

Methodological basis of the educational programme

The one-week educational programme consists of four phases: 1) presentation of the conceptual framework and the concepts and tools "glossary" elaborated by the French-Italian team, 2) presentation of a small territory and its agro- environmental problematic that will be the common case study of the students, 3) parallel students groups working on one specific agro-environmental issue identified in the area by analysing the problem and indicating possible ways towards a solution in collaboration with two scientific tutors of different disciplines, 4) final oral presentations on fieldwork results for the stakeholders. At the end of the week an evaluation of the programme content and form was discussed with all students. An individual ex-post analysis of fieldwork results and a final written essay on a theme related to the WSLA students are asked to mobilise concepts and methods presented during the winter school.

Description of the course

Aim of the course

This course is aimed at PhD students working in the field of landscape agronomy but is open to MSc students who follow modules in agro-environmental problems and agricultural landscape or territory management. However, the course is structured in order to be instructive for all people involved: teachers, case-study tutors and stakeholders.

The central position of PhD students requires that organisation shall be directed by a University, but close collaboration with the case-study stakeholders should be stimulated. Our experience shows that this is not always easy and success depends on the attitude of stakeholders towards discussion and confrontation with new opinions and experiences, and on putting in place suitable processes to facilitate their collaboration. The course aims to open-up the minds of students interested in agro-environmental problems and to stimulate them to study these subjects in a wider context. We especially wanted to create an experience which shows them the importance of stakeholder collaboration and at the same time the problems associated with their involvement.

Content of the programme/course

Given the variability in case study area and therefore in agro-environmental problems treated in the WSLA, the target objects of the WSLA are flexible and they are likely based on agronomy, livestock sciences, geography and landscape planning. This has also implications for the scale of the case study and the focus will vary between individual farming systems and land use systems, and/or processes taking place at local scales. Also the importance of upscaling and downscaling between these levels will vary from case study to case study. The importance is that during the conceptual introduction all these considerations are transmitted to the students in order to enable them to evaluate each new situation adequately and take into account the most relevant time and spatial scales. The developed conceptual framework (Fig. 1) proved its usefulness for this purpose.

Analysis of the interactions between research disciplines and between research and education/formation

The case study is a meeting point for students (both starting and finishing their PhD project), researchers and stakeholders coming from various disciplines and backgrounds. It is the mean to test the appropriateness of the conceptual framework we developed (Fig.1) and whether associated concepts and tools are sufficient. The case study is the part where students will learn to apply and combine the concepts and the tools. Case study tutors follow their learning path and guide them towards an analysis of the case study through documents analysis, field visits, oral presentations and discussion with stakeholders and with their fellow WS students. This interdisciplinary approach is the driver of students' curiosity but can also distract them from the original mission, whereas they often mention that interaction with stakeholders, even if difficult, is the most stimulating part.

Links between the educational programme, and action and work experience

In this WSLA, the concepts presented have to be used in a case study. Students have to interact with the different stakeholders. In this way they become aware of the complexity of agro-environmental problems and of the difficulty to find solution, which are not only scientifically and technically correct but also socially accepted. These are situations they will have to confront in their working life and a good preparation is therefore indispensable.

The involvement of the stakeholders is therefore important. In order to optimise the interactions between students and stakeholders, they should perhaps be consulted by the case study team in an early phase of the preparations. Normally stakeholders are not used to be involved in education and science and a better instruction on their role and on the expected outcome of the case study can help them to clarify their ideas on the case study. A possible side effect may be that they will be more receptive to the outcome of the case study analysis and discussions and that this activity may really contribute to a better understanding between the stakeholders involved in the case study area.

Evaluation

The case study changes from year to year and therefore also the problems change. However, the organising team is gaining experience and gradually finding out more and less successful approaches. The conceptual framework proved efficient in guiding the students and helped them to position their case study experience in the larger Landscape Agronomy field (see next section for details). Stakeholders' involvement is certainly a delicate point and needs more attention in the future. It may be necessary to spend more time on this aspect and involve more directly social sciences in the first part of the course, which regards the methodological framework, or to dedicate special attention to sociological tools. The contribution of social sciences can possibly enrich the WSLA at two levels. First it could enrich the methodological framework with important knowledge and tools regarding the human and social dynamics that contribute to build up territories at different scales, and regarding

the human and social driving factors of the processes of agricultural management from farm to collective scales. Second, social sciences could likely provide tools for better understanding and maybe mastering the conditions for an effective partnership with stakeholders.

Since students have very different backgrounds and interests, and this changes from year to year, it is very difficult to define the input level and the lacks in basic knowledge that should be filled up in order to give them all a more or less even start at the WSLA. One effort that was made is the collection of the research projects and CV's of the students before the winter school, to give the organising team the possibility to determine the level of the students and try to take their interests into account. At the same time this allows for the definition of some basic literature which students should prepare before coming to the WSLA. No test on this has been imposed so far, but it may be an idea to open the winter school with a discussion on the papers that were provided.

This WSLA experience made us become very much aware of the fact that a lot of basic information is missing. Each student knows something, but no-one has a good preparation on all aspects related to a landscape approach to agro-environmental problems. It is outside the scope of the WSLA (which lasts only 1 week) to provide such information, but it became clear that educational programmes of agronomy students and alike, would benefit from extended modules in their basic MSc courses, or from integrative modules in their PhD courses. However, this implies the need for a clearer definition of PhD projects in the field of Landscape Agronomy and the need for definition of additional transversal and interdisciplinary courses in their educational programmes.

The 2009 case study

The case study selected for the 2009 WSLA was voluntary based on the research project of one of the PhD students from the French-Italian team in order to make the WSLA as much tangible as possible and show the real benefits of a landscape agronomical approach to certain agro-environmental and territorial issues. The theme of 2009 was '*The relationships between arable cropping systems and surface water protection in the Massaciucoli watershed reclamation area near Pisa*'. Three case study groups each worked on a different theme: water quantity, nitrogen pollution and phosphorous pollution. Groups were formed to contain as much as possible students from different levels and from different backgrounds in order to make best use of interdisciplinary interactions. Each group was guided by a case study tutor, expert on the subject, and a teacher of the WSLA. All students were presented with general geological, agronomical, environmental and socio-economic information regarding the case-study area and a common field visit and meeting with local stakeholders took place. The three groups analysed available information and became aware of the importance of analysis of analytical data regarding the entity, quantity and dynamics of pollution or water fluxes. At the same time they learned to transmit this information in a synthetic and comprehensible way to local stakeholders and fellow students, not considered experts in this matter. This exercise also urged them to make choices regarding the scale at which the analyses were carried out and it demonstrated the differences in view that appear during upscaling and downscaling processes.

After the final presentation students were asked to position their case study work in the conceptual framework (Fig. 2). They should indicate the role of each pole in their work, the type of interactions they studied and the social, temporal and spatial dimensions they valued most effective for the analysis of the agro-environmental problem they had been asked to analyse. From this analysis they were able to compare the approached followed by the other groups and to become aware of alternative options or aspects they had neglected.



Figure 2. Field trip and three case study analyses according to the theoretical framework created by the WSLA teaching team.

Innovative aspects added to educational curricula

At the end of the week students frequently mention that their eyes had been opened towards certain aspects which so far they had largely ignored in their studies of agro-environmental and territorial issues in agronomy. This regarded both concepts and methods related to notably interdisciplinary and multiscale approaches in this domain. Agro-environmental problems require on the one hand the capacity to deal with very specialist issues such as chemical analyses, interpretation of a wide variety of scientific data, including from interviews of stakeholders of very different backgrounds (e.g. policy makers, environmentalists, agronomists, farmers) and on the other hand the capacity to keep the overview of complex problems and therefore the need to zoom-in and -out continuously. To transmit this to students in just one week is not easy, if not impossible. Despite the short time available in the WSLA, students got aware of new approaches towards agro-environmental and territorial problems and it made them realise it is important to go back and forth between obtaining detailed knowledge on specific themes and research methods, and evaluating the problem as a whole with identifying the different levels of organisation.

The presentation of a common framework has proven to be useful. On the one hand it allowed the teaching team to position the methodological and conceptual presentations within this framework, and on the other hand this allowed students to better see the interactions between themes that may seem completely independent from each other at first sight. It also helped students to realise where their efforts have been concentrated so far, and what can be the advantages of including also the other themes and approaches in their research.

A second and common eye-opener was the central role the interaction with local stakeholders can have in determination of the problem definition or in the definition of possible solutions to agro-environmental and territorial problems. In other words, the proposed 'landscape agronomy

approach' contributed to a wider definition of the factors that were at the base of a critical situation for sustainable land use management, and at the same time to a wider definition of solutions, including the points of view of all interested stakeholders.

Created synergies

The three interdisciplinary groups that worked on water quality (nitrogen and phosphorus) and quantity in the Massaciuccoli basin all offered a new perspective to the analyses performed during the PhD project. The students also became aware of the stakeholders perspectives in complement to a "pure" scientific analyses of facts. They learned that research can have a profound impact on society and that technical solutions will only be adapted if they are relevant regarding social and economic dimensions of that society.

The Land Lab research team of Scuola Sant'Anna, dealing with Massaciuccoli basin issues, became aware of their possible role as 'mediator' between local stakeholders by i) providing impartial and objective data on the state of the agro-environment and the processes which are affected by the agricultural and other human activities performed in the area and ii) by creating scenarios based on viewpoints of all different stakeholder groups involved.

As for the stakeholders, we hope they became aware of the fact that the objective of researchers is to contribute to solutions to an existing problem in an acceptable way for all stakeholders involved without creating new problems. The fact that the agro-environmental issues were analysed and presented by students instead of by established researchers may have solicited a more open-minded attitude of the stakeholders and the students' presentations may have had a 'mirror' effect.

The WSLA team collectively tested the efficacy of the conceptual framework for studies in the field of Landscape Agronomy. The framework helped the teachers to position conceptual and methodological aspects of landscape agronomical research and thus made it easier for students to see the connections between the many seemingly unrelated issues. In a second moment the framework proved useful in the analysis of the case study work performed by the students. Through confrontation of their work with the Landscape Agronomy framework they realised which aspects had been overlooked or give minor importance, which aspects were strongly interacting and which choices had or had not been made.

Course prospective

Students give very positive reactions and for most of them it helps to better develop their PhD projects. An important benefit is the opportunity for the group of tutors and students to concretely test the conceptual framework for landscape agronomy with professional actors in natural resource and territorial management. All students are different and each of them brings news ideas and visions which enrich tutors' and other students' ideas. This is why the WSLA will be continued in time. The diversity in students and case studies makes that also the tutors of the WSLA are still learning from this experience and are continuously looking for ways to improve. For the next WSLA attention will be paid to:

- The lack of interdisciplinarity of the single students; a solution might be to create the case study group composition in such a way that the group as a whole becomes interdisciplinary, however, this cannot be guaranteed and does not resolve the problem of individual problems of comprehension of specific issues.
- Stakeholder involvement and the best way to do that; presentation of tools which will allow students to better interact with the stakeholders and a greater involvement of stakeholders in the educational programme could be made by consulting them in an early phase of the preparations

Overall this WS would greatly benefit from a more interdisciplinary educational programme of the PhD courses in Agronomy so that students will be more prepared to deal with the wide variety in disciplines one can encounter when getting involved in agro-environmental problems.

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