

Landscaping the sustainability of the farm of tomorrow

Stella Agostini, Francesca Mesiti

University of Milan, Agricultural Engineering Institute, Italy - stella.agostini@unimi.it

Abstract: *Everywhere the diversity of landscapes makes simple recipe approaches difficult. Understanding the process of landscape change, and the community's perceptions to it, is crucial when deciding the most appropriate farm management approach. The economic development, technological growth and agriculture evolution in last decades brought about deep and quick changes in farming system, altering shapes of their landscapes and their relationships with places and people. Some results of these changes are the loss of the sense of place and the decrease in environmental quality of the farm in itself and in its context. If farmers are asked to increase their competitiveness to answer to the quick evolution of the markets, the implementation of European Landscape Convention evokes carefully managing the effects of the farming development on drawing new scenarios. Preservation of the status quo in agricultural environments is often not an option. But the process of development can be used creatively to encourage change in a way that provides environmental benefits while enabling a positive economic outcome for farmers. To achieve this, the focus should be on managing the effects of change. In this respect the students attending the course on Farm Buildings Design at the Agriculture Faculty of University of Milan are asked to design farms, integrating different aspects of farming presence, from landscape quality, to environmental sustainability, from economic evaluation, to social and cultural factors. The paper introduces some of the results carried out, illustrating the methodological work applied for analysing the effects of interventions on the landscape of the farm in Northern Italy.*

Keywords: *farming system, landscape, sustainability, design, planning*

Target objects

The educational programme of the course on Costruzioni Rurali II - La progettazione (Rural Buildings II – elements of design), examines general principles that affect construction and its relationship to design intentions. The aim of this course of specialist degree is to provide students with tools and knowledge for the design of farm buildings in land and landscape. The format of the course includes 4 credits (ECTS), two weekly lectures, weekly discussion sections, and several basic design problems, including a first approach to project delivery. Exercises that provide a focus for discussion and practice relating to the broader issues of the course are centred on visual, cultural, and historical aspects of the farming system as man-made environment using examples from the field of architecture and the allied arts. Upon completion of the course, students are expected to demonstrate their understanding of the effects of their own application on changing farm, land and landscapes.

Target activities

Target activities of this educational program were diversified according the reform of the Italian University System, in order to relate the load of work conventionally fixed for every level degree. Before the reform, all students attending the course on Rural Building were focused on an ergonomic approach of the design. To provide them with a general vision of the farm on the land they were asked to survey farms in four layers, looking at (fig 1):

1. natural and environmental resources and tasks of planning schemes;
2. analysis and evolution of productive processes and of the transformations produced by farming system in the surrounding agricultural landscape over the years;
3. analysis of the materials available and definition of the main features of the built group (volumes, degree of conservation, arrangement; composition; style, functional aspects, etc.).
4. production processes (quality of stables, work safety, crops, animal rearing, mechanization, etc.).

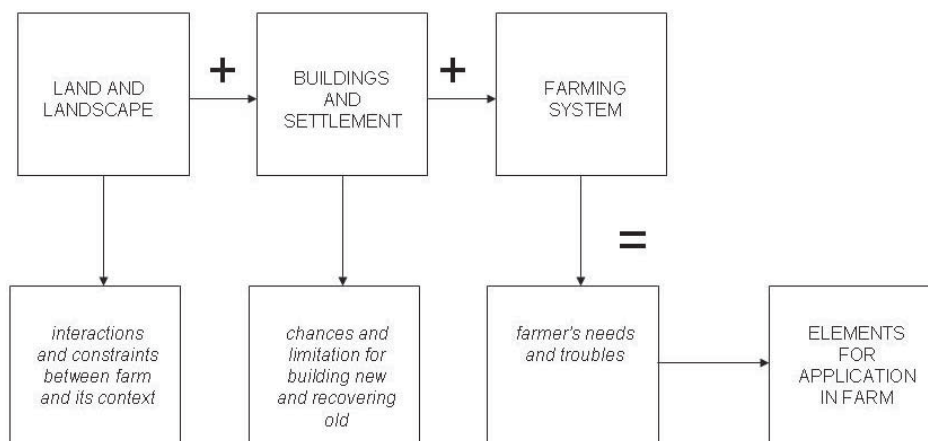


Figure 1. Methodological work for the holistic analysis of the first level degree

After the understanding of existing constraints in terms of natural and environmental resources and planning regulations, the first phase considered the historical evolution of production patterns and the transformation of the landscape produced by the farm. Based on the features characterising the agricultural landscape since the beginning of the farm, this stage aimed to evaluate its changes over the years. The second stage of the survey was finalised to look at a farm and its buildings, understanding the architectural organisation and structure.

Special support forms were created for each of the sections. Data collecting makes it possible to compare farm requirements and buildings conditions, so as to evaluate how to build the new structure or/and if redundant buildings could be recovered (Sangiorgi, Agostini, 1998).

After the reform of the Italian University System, the course on rural building was split in two levels degree. The course of the first level degree (Rural buildings I) provides an ergonomic approach with the analysis of work conditions inside the buildings.

Students attending the course of the secondary degree, Rural Buildings II, are asked to implement the ergonomic layout in the land, designing farm components, integrating different aspects of farming presence, from landscape quality, to environmental sustainability, from economic evaluation, to social and cultural items (fig 2).

In order to understand the main factors that, directly or indirectly, can influence the design of farm buildings, each student is invited to chose a sample farmstead of particular relevance to investigate with holistic approach, in order to introduce an application. Students are contacted on a weekly basis and the research is completed within the space of four months.

At the end of the course, each student is asked to produce a report where the results are presented, defining the key drivers for the evaluation of the effects of the application on the farm and on its landscape. The presentation of the final results can be made in different ways. Usually students present their conclusions at a public seminar.

When the quality of the practical work is particularly good students can be invited to present the results of their research on scientific congress. The example presented in this paper is from the course of secondary degree...

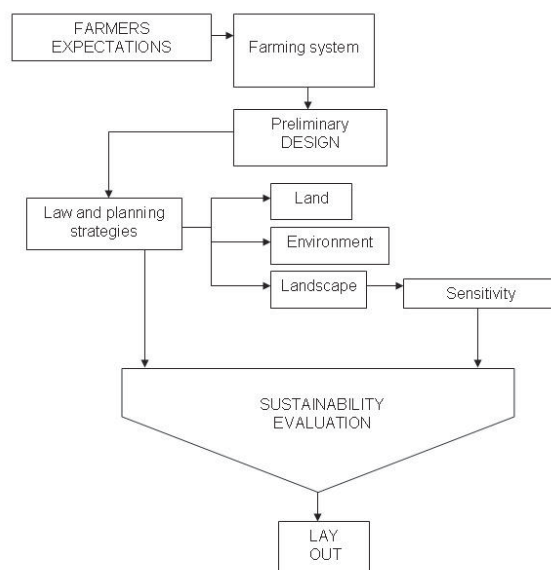


Figure 2. Methodological work for the experimental report of the second level

Research disciplines and approaches involved

In the last educational programme farm is analysed as a special site in which farm buildings and its landscape have been shaped by agricultural practices according to models depending on culture and development. The survey has to record and express the long processes of historic development of the farm under consideration, forming the essence of diverse national, regional, indigenous and local identities and is an integral part of modern life, and an important foundation for development, both now and into the future. The conservation of these balanced features is read as fundamental for the enhancement the farm value, linking the implemented approach with:

- agricultural engineering
- livestock sciences, in order to understand farming system;
- geographical sciences,
- landscape and territory agronomy, in order to read landscapes patters and sense of place;
- architecture-civil engineering to read building structures and components;
- Planning, in order to understand coherence with settlements and land development.

Elements contributing to combine different disciplines and approaches

The study farm is located in Lombardy (fig. 3), at the edge of the protected area of the Ticino Park. The first farm buildings were built in the XV century, the last one at the end of the 80s. The Used Agricultural Area (SAU) is 129 hectares. The production is cereal-milking with cheese monger. The research objective was to define how to provide this farm with a specialised building (creamery) in which to transform milk and to store cheese. The farmer's expectations identified three possible solutions to investigate:

- A. design a new brick structure for creamery
- B. build a prefab volume
- C. recover the old creamery

The research was focused on achieving which solution could provide environmental benefits while enabling positive economic outcomes for the farm.



Figure 3. Farm views

To compare the preliminary solutions and to analyse the relationships between practices and landscape, the farm landscape was analysed by looking for the characteristic features of the Lombardy plain, taking into account buildings, water, fields, vegetation and various elements connected with the use of the soil. To avoid any personal bias in the researcher a form was outlined to guide this phase of landscape analysis (Agostini, 2007).

An index was assigned for each recognised element of the landscape, following its leading role in the compositional system of the rural landscape. Invasive elements were given a negative value.

These first results were compared to the criteria defined by the regional landscape and development land planning schemes in order to outline the sensitivity of the local landscape.

The sensitivity of the landscape was analysed looking at the farm in its own micro-landscape (a small scale landscape, comprised in the farmstead space) and macro-landscape (wide scale scenarios, looking at the composition of general). These scenarios were analysed in three levels:

- structural: the morphology of the landscape
- visual: the influence of the farm on the general perception of the place
- Symbolic: the influence of the farmstead in the identity of local community and in its links to historic events of local culture.

Then the three preliminary solutions were compared with the local built references (looking at coherence of style, form, appearance, buildings materials and construction system etc.) to define their affect on the land (Tab. 1).

PRELIMINARY SOLUTIONS						
AFFECT ON	New masonry building		New prefab structure		Recovery extant	
	landscape		landscape		landscape	
	micro	macro	micro	macro	micro	macro
Coherence of style, form and appearance	3	2	4	3	1	1
Construction systems and crafts	2	2	4	3	1	2
Visual features	1	2	2	3	1	1
Environment	1	1	2	1	1	1
Social community	1	1	2	1	1	1
Partial Evaluation	1,6	1,6	2,8	2,2	1	1,2
Final Evaluation	2		3		1	

Legenda: 1: low 5: high

Table 1. Evaluating affect on the land

In order to define the impact of the application in the landscape, the results of tab.1 were compared, with the sensitivity of the farm landscape, according the criteria defined by the local law (D.G.R. Lombardy n°7/11045). The index of a critical landscape sustainability was fixed in a value bigger than 16 (Tab.2).

		Affect on the landscape				
		1	2	3	4	5
Landscape sensitivity	5	5	10	15	20	25
	4	4	8	12	16	20
	3	3	6	9	12	15
	2	2	4	6	8	10
	1	1	2	3	4	5

Table 2. Evaluating impact of preliminary design intentions

After a careful analysis of each aspect of the three proposed solutions, with an approach combining elements of the above mentioned disciplines, looking at their structural conditions, identity features, local constraints, costs and resources, the final results outlined the best solution for the farm, as synthesized by tab 3.

PRELIMINARY LAYOUT	ECONOMIC VALUE	FUNCTIONAL VALUE	IGIENIC AND SAFETY	LANDSCAPE VALUE
<i>New masonry building</i>	● ●	●	●	■
<i>New prefabricated structure</i>	●	●	●	▲
<i>Recovery extant</i>	●	■	●	●

Legenda:

- YES
- ▲ NO
- RISK

Tab. 3. Evaluating sustainability of three preliminary design intentions

Course elements contributing to successes or difficulties

Over the last ten years, before and after the Italian University reform, more than 250 farms have been surveyed following these methods, involving around one thousand students.

The practical work consents to link lectures with the goal to train professional agronomists able to effectively operate, within the competences set by Italian law.

Thanks to the direct contact with farmers, who express their perplexities and voice their problems, students have a direct response to their preliminary design intentions, derived by the ergonomic approach. The direct contacts with local administrators make students face real problems and at the same time they are given the opportunity to train and carry on his type of work even when their University years are over. The main difficulties are caused by:

- a need of simplification of the proposed approach in order to become easier for all the students, with a lower work load.
- the reorganization of the educational programmes in the Italian University.

With the new courses only students attending the specific topic on design of farm buildings in the landscape will be able to access this practical field work. This means that technical knowledge risks to be separated from cultural awareness and that future agronomists will not be able to control the statutory process linked to the implementation of the projects in farms.

How to mobilize stakeholders

At the moment the involvement of stakeholders was limited to the phases of investigation. The task of the educational programme is to provide students with a methodological framework by which a case can be made out that if the operators do not follow the processes then the Local Planning Authority would be justified in refusing permission for a new farm building or recovering an existing one. Mobilising stakeholders, not yet implemented, could make the formative activity more attractive for the students, encouraging them to do the practical work of the course as a preliminary professional practice, linked with their future job opportunities.

Education for occupation

The design in farm is intended as a way to appraise and analyse some complex situations connected with farming system in order to highlight the conditions, problems and potential of the farm under consideration. Students, once they graduate, will know how to operate to introduce and evaluate applications in the field of rural areas as well as for that of rural heritage management. They will be fully aware of a number of problems, such as:

- applying current norms to farm building design
- persuading farmers that their applications are correct
- understanding the relationship between needs of farmers, farm building and the land context
- taking into account the possibility of reusing existing buildings
- reading the sense of the place, drafting a special image of the local countryside
- evaluating the impact of development on rural landscape
- measuring the sustainability of required changes in farms

The results of the experience, supporting improvement in practice of agricultural production, contributes to the training of highly qualified professionals in the sector of land and landscape management, the training of farmers, farm decision-making, as into public policy making, and the development of the quality of the farm of tomorrow in a management context. It may also be of assistance to those involved in resource consent applications in rural areas where there are landscape issues. The work involves also competences in recovering neglected farm buildings, training technicians who will be able to revitalize the existing rural heritage by successfully handling the balance between cultural elements to be safeguarded and new agricultural techniques to be implemented.

Conclusions

With the rapid transformation of international markets and globalisation, farmsteads with their pattern of arable fields are one of the landscape's important assets. The integration of farm buildings within the landscape also represents a major economic asset in terms of the capacity of the farmstead to enhance its own value on the land. The aim of the educational programme is to define and understand the complexity of project in farm, including farming methods and practices, availability of resources and landscape patterns. In this case, landscape analysis serves as a preparatory function to help develop concepts for farm projects within the scope of general planning activities. Stating that even contemporary work on farm buildings, groups and settlements should respect the traditional character and the local cultural values of each place, the activities of the course provide agronomy students with a code of good practice to guarantee the congruence between the respect of the sense of place within the farming systems requirements.

Building in farm needs to be developed on the basis of criteria which are not only functional or architectural. Meanwhile agrarian cultural landscapes are erased day by day and we are invited by the Council of Europe to apply the European Landscape convention. The urgency of these problems requires that the quality of the designed farm buildings in land and landscape become a recognised emergency for all agricultural faculties. The support of local administrators or farmers organisation on it would be precious to open new competencies, new chances of job for post graduates. Overall it would mean a new quality for the identity of the farm of tomorrow, teaching new generations of farmers and technicians to build the new rural heritage.

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