

# A FOCUS ON PEDAGOGY

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# A Focus on Pedagogy: Teaching, Learning and Research in the Modern Academy



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# TEACHING AND LEARNING LANDSCAPE ECOLOGY TO LANDSCAPE ARCHITECTS IN ITALY. TOWARDS PROTECTIVE, ADAPTATIVE, REDUNDANT LANDSCAPE DESIGN

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## INTRODUCTION

### Motivation

Landscape Ecology is a discipline that integrates concepts of general and animal ecology, science of vegetation, socio-economic and geographical disciplines through its own consolidated paradigms and models. Thanks to the holistic vision of the Landscape Ecology, which integrates the anthropic and the natural components, complex systems such as ecological ones can be studied and evaluated, also through appropriate qualitative and quantitative indicators. <sup>1</sup>

In a present and future reality in which the anthropic pressure on the planet will be increasingly high, with consequent further alterations on the landscape and the environment, the figure of the landscape ecologist becomes decisive: the one who, as "a physician of environmental systems", <sup>2</sup> has the right tools to deal with issues such as nature conservation, fragmentation and disturbance of ecosystems, the study of biodiversity, the assessment of environmental quality, climate change, ecological design and territorial planning. Having healthy ecological systems ultimately means protecting human health. <sup>3</sup>

The fragmentation and alteration of ecosystems (and in many cases their disappearance) and the invasion of fragile natural ecological systems, creates dangerous mixes between man and nature. The worldwide health emergency linked to the SARS-CoV-2 coronavirus has made us reflect on the spillover phenomenon of viruses from animal to man, at the basis of many pandemics. Most of the potentially lethal viruses for humans remain unknown, living within host species in stable ecosystems, with high biodiversity and little or no anthropization. The alteration of the balance of these ecosystems can bring out the viruses that infect humans, causing pandemic zoonoses. <sup>4</sup>

Scientific researches <sup>5</sup> consider air pollution as a co-factor for the spread and aggravation of viral diseases. In particular, pollution makes us more vulnerable to the occurrence of the most serious outcomes of the pandemic, as it compromises the body's defensive first line, hence the importance of the beneficial effects of ecological systems in the urban areas.

The teaching of Landscape Ecology in Landscape Architecture Degree courses plays a crucial role in the training of students who will become tomorrow's designers and planners.

Facing the challenges of contemporary society, it is more and more necessary to educate the students to the project of urban protection systems, for the quality of life and health of citizens.

## Goals of the study

This paper provides a complete picture of the teachings related to the Landscape Ecology in the master's degree courses of Landscape Architecture, in the Italian Universities, highlighting any absences and inadequacies. Only master's degree courses have been considered, because they are actually the only educational training to the full profession of the Landscape Architect in Italy.

Landscape Ecology is a fundamental discipline to understand the multi-dimensional complexity and the evolutionary trends of landscape, necessary to guide and to enrich the projecting process, adding quality control elements in landscape planning or design.

## THE ITALIAN SITUATION

### The Landscape Architecture master degree courses

In Italy, there are currently 5 master's degree courses in Landscape Architecture, one of which involves 4 universities (Table 1). The oldest are the degree course of Florence (2008) and the inter-university degree course of Genova, Milan, Turin (2010) that were born as a continuation and extension of the historic Florence and Genoese Landscape Architecture School. Then follow Rome (2018), Milan (2017) and Palermo (2020).

Master Degree Course	University
Landscape Architecture	Florence University
Green Areas and Landscape Design	Genoa, Milan, Turin Universities, Turin Politecnico
Landscape Architecture	Rome La Sapienza University
Landscape Architecture. Land Landscape Heritage	Milan Politecnico
Landscape Architecture	Palermo University

*Table 1. The Landscape Architecture Master Degree courses in Italy.*

The master's degree courses are biennial. Graduates can practice the profession of Landscape Architect, after passing an appropriate qualifying state exam. The data relating to the employment of graduates in Green Areas and Landscape Design (Tab. 2) are rather encouraging.

	Employment rate	Not working graduates who are engaged in traineeship	Use of acquired skills
Graduates in 2017 after 1 year (n° 58)	75,8 %	6,1%	58,8 %
Graduates in 2015 after 3 years (n° 73)	74,3 %	2,9%	42,3 %
Graduates in 2013 after 5 years (n° 58)	86,3 %	-	52,0 %

*Table 2. Occupation of Graduates in Green Areas and Landscape Design (Alma Laurea, 2019<sup>6</sup>).*

In fact, 75.8% of graduates, after 1 year, have a job, and the percentage increases to 86.2% after 5 years from graduation. In addition, almost 60% of graduates say they use the skills acquired during the degree.

### The teaching of Landscape Ecology

Teachings of Landscape Ecology are present, in different ways, in all the 5 master's degree courses (Table 3). In a more powerful way from the Degree course in Green Areas and Landscape Design (140 hours), which deals with topics of Landscape Ecology also with seminars, intensive workshops and theses.

Master Degree Course	University	Teaching	CFU / hours	Teaching Organization
Green Areas and Landscape Design	Genoa, Milan, Turin Universities Turin Politecnico	Landscape Ecology	6 / 60	Lessons and practical exercises
		Applied Landscape Ecology	6 / 60	Lessons and practical exercises
		Ecological quality of the urban environment (mod. of Urban Environmental Design Studio)	2 / 20	Lessons, practical exercises, project
Landscape Architecture. Land Landscape Heritage	Milan Politecnico	Ecological Landscape Planning	8 / 80	Lessons, practical exercises, project
Landscape Architecture	Florence University	Fundamentals of urban and landscape Ecology	6 / 48	Lessons and practical exercises
Landscape Architecture	Palermo University	Landscape Ecology	6 / 48	Lessons and practical exercises
Landscape Architecture	Rome La Sapienza University	Landscape Ecology (mod. of Planning and Landscape Infrastructures Studio)	3 / 24	Lessons, practical exercises, project

Table 3. The teaching of Landscape Ecology in the Landscape Architecture Master Degree courses.

### DISCUSSION

The data, relating to the previously exposed teachings of Landscape Ecology, show that the inter-university degree course dedicates a good share of hours to this discipline.

A motivation of this is to be found in the Genoese Landscape Architecture School tradition, where the theoretic teaching by Almo Farina and Vittorio Ingegnoli (belonging to the “second wave generation” of landscape ecologists) focused on the importance to understand the fundamental dynamic concepts of landscape dimension.<sup>7</sup>

Moreover, the applicative courses and experimental design of landscapes, at different dimensions, relied on the discipline of Landscape Ecology as a clear guide to the understanding of landscape configuration, and of its critical actual aspects.

In the construction of the educational path of the inter-university master's degree, the role of Landscape Ecology has remained basic, with a first theoretical course, a second more applicative one, completed by the insertion of a module in a Design Studio and in assuming the point of view of the discipline during visits and to guide the elaboration of thesis.

In particular, the course of Landscape Ecology is carried out in the first semester of the first year, and is followed by all enrolled students, as a fundamental basis educational course to prepare the landscape architects. The course includes theoretical lessons, seminars and a practical exercise. In the exercise, the students work in groups and can analyze a portion of the territory, identifying the environmental mosaic, mapping different patterns in landscape heterogeneity, experimenting the tools by applying the "patch, corridor and matrix model" (Fig. 1). They can learn to quantitatively analyze the margins between the different patches, highlighting the different levels of ecological criticality (fragmentation, disconnections, fragility). Finally, for each type of patch, they identify the current ecosystem services and indicate which ones could be enhanced, or created, through an appropriate landscape project.

In the second semester of the first year, the students can deepen the concepts studied in the precedent course in the course of Applied Landscape Ecology. The students learn to study the structure of a landscape and evaluate its state of balance. They can also use quantitative and qualitative indicators to understand the characters of a study area, at different spatio/temporal scales, by specific parameters such as spatial arrangement and landscape memory, to guide a project. The applied exercises lead the students to landscape analysis, planning and design through applied landscape ecology, deepening the discipline with case studies applied to EIA (Environmental Impact Assessment), VAS (Strategic Environmental Assessment), Landscape studies and Landscape Relations.

In the second year the students can choose the Urban Environmental Design Studio, have the possibility to apply the principles of Landscape Ecology to urban environment, facing a significant study-case, on which to develop a landscape plan or design, thanks to the module on Ecological quality of the urban environment.

To complete the education of the students, study visits with a team of teachers are proposed, to immerse in the landscape and see it under different points of view and with the tools of Landscape Ecology to interpret it.

At the end of the two years some students can choose to develop Landscape Ecology in their final thesis. These are moments for the deepening of the discipline, in which the students can apply Landscape Ecology principles and tools to diagnose the landscapes in question and to be able to define suitable contents in the landscape planning and/or design interventions.

**INTERFERENCE DEGREE OF THE MARGINS OF THE PATCHES**

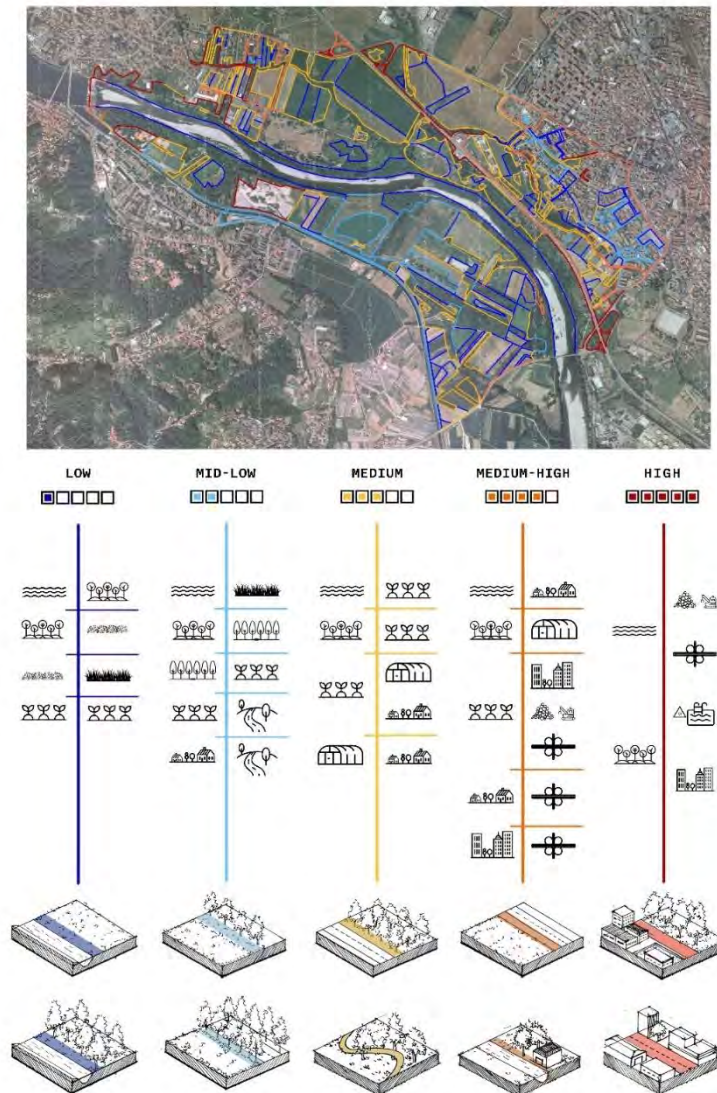


Figure 1. Master's Degree on Green Areas and Landscape Design (Genoa, Milan, Turin), "Landscape Ecology" Course 2019-2020 (Prof. Ilda Vagge), Students: Sergio De Pra, Lijun Li, Anna Sarzetto, Nicolò Tonin, Marco Toniolo, Exercise on the Ecological Quality of the Margins of Patches.

**CONCLUSION**

Although the importance of this discipline for Landscape Architecture was theorized since the birth of Landscape Ecology <sup>8</sup>, still in most Italian Universities too little space is devoted to this teaching, especially dedicated to Landscape Architecture students. An increase in discipline would be appropriate, both as a single course and within design studios, to integrate other disciplines. In a historical moment in which the work of the landscape architect is increasingly challenging, since it is conditioned by planetary problems (climate change, water scarcity, deforestation, loss in biodiversity



...), the knowledge of Landscape Ecology can help him to plan implementing rich territorial ecosystem services and lowering its projects in harmony with the ecological-environmental context.

The living system of our planet has strongly been affected, in recent time, because of different stresses and disturbances caused by human actions. The capability to read the evolution of the ecological mosaics, to grasp an interpretation of the ecological complexity leading to foresee future sceneries, becomes relevant to propose durable solutions, connecting sustainability, biodiversity and landscape ethics.

In the developing of Landscape Planning and Design, there is clear evidence of a need of new competences, to be able to face the continuous transformation of urban spaces and urban green systems, considering the changes of the physical conditions and of the mutation of social needs. It is also necessary to know how to involve and make citizens and stakeholders aware of the real needs of our living environment, with a project that is able to communicate the importance of ecosystem services and the resources of natural heritage, changing people perception of landscape.

An adaptive quality of landscape design is linked to the knowledge coming from Landscape Ecology discipline, to manage these changing characters of landscape, in order to guarantee sufficient standards to protect people from degradation and discontinuities.

## NOTES

<sup>1</sup> Chowdhury and Turner, "Parallel trajectories and increasing integration of landscape ecology," 2019; Li, 2000; Musacchio *et al.*, "Changing landscapes, changing disciplines," 2005; Naveh, Interactions of landscapes and cultures, 1995; Naveh, "What is holistic landscape ecology?," 2000; Naveh, "Ten major premises," 2001; Palang *et al.*, "Holistic landscape ecology in action," 2000; Tagliaferro *et al.*, "Cultivating deep care," 2013; Tress *et al.*, "Clarifying Integrative Research Concepts," 2005; Wu, "Landscape ecology, cross-disciplinarity, and sustainability science," 2006.

<sup>2</sup> Ingegnoli and Giglio, *Ecologia del paesaggio*, 2005; Ingegnoli, *Landscape Bionomics*, 2015.

<sup>3</sup> Farina, "Cultural Landscape as a Model for the Integration," 2000; Frazier *et al.*, "Ecological civilization," 2019; Frazier *et al.*, "Linking landscape ecology and land system architecture," 2019; Lindenmayer *et al.*, "Experimental evidence of the effects of a changed matrix," 2019; Musacchio, "The ecology and culture of landscape sustainability," 2009; Musacchio, "Cultivating deep care," 2013; Naveh, "Landscape ecology and sustainability," 2007; Opdam *et al.*, "How can landscape ecology contribute to sustainability science?" 2019; Wiens, "Landscape ecology as a foundation for sustainable conservation," 2019; Wu, "Integrating Nature and Culture," 2011.

<sup>4</sup> Quammen, *Spillover*, 2012; Kreuder Johnson *et al.*, "Spillover and pandemic properties," 2015.

<sup>5</sup> Conticini *et al.*, "Can atmospheric pollution be considered a co-factor," 2020.

<sup>6</sup> Alma Laurea Interuniversity Consortium (2019) Single Annual Report, Satisfaction and employment conditions for graduates, <http://statistiche.almalaurea.it/universita/statistiche/trasparenza?codicione=0100107300400001> [Accessed 3 May 2020].

<sup>7</sup> Farina, *Ecology, Cognition and Landscape*, 2009; Antrop and Van Eetvelde, *Landscape Perspectives*, 2017.

<sup>8</sup> Naveh, "Landscape Ecology as a Scientific and Educational Tool" 1980; Wenche *et al.*, *Landscape ecology principles*, 1996.

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