EDUCATION FOR RURAL DEVELOPMENT TOWARDS SUSTAINABILITY AND RESILIENCE: A METHODOLOGY TO APPLY OBJECTIVE CRITERIA FOR INTEGRATING RURAL BUILDINGS FOR URBAN AND LANDSCAPE DESIGN STUDENTS

Dr. Jin Su Jeong (jin@unex.es)
Dr. Lorenzo García-Moruno
Dr. Julio Hernández-Blanco
Dr. María-Jesús Montero-Parejo
Universidad de Extremadura
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  : Various backgrounds for the foundation of this educational research for urban and landscape design students.

- **Proposed case study area**
  : Hervás, Spain mixed with urban, rural, and natural aspects to integrate rural buildings into a landscape.

- **Location analysis**
  : Multi-criteria identification, Location suitability evaluation.

- **Façade color analysis**
  : External and internal color measurement, Color impact evaluation.

- **Conclusions**
  : Objectives and findings from this educational studies.
Motivations

• Rural development has been neglected to a large extent in the context of sustainability and resilience.

• Similarly, its education was largely overlooked and is necessary to rethinking in the issue and debate of current rural development.

• Careful site and facade color analysis are the starting point process in urban and landscape design education and needs to follow objective criteria.

• The challenge of establishing the objective criteria to integrate buildings into a landscape has been made to pay attention in design education.

• Still, only few studies have conducted for landscape and urban planning education settings.
In the case of the integration of rural buildings and their surroundings in the urban and landscape design education, two methods are to select the proper location.

Based on GIS and to stance the visual element evaluation of man-made constructions and other landscape components on photographic management as the below:
* Proposed Case Study Area

- Portugal
- SPAIN
- Cáceres (Extremadura)
- Ambroz Valley
- HERVÁS

Case Study Area
Multi-criteria spatial methodology
Extensively considered the criteria and evaluation processes, and classified into six restrictions and three main criteria involved in the calculation process:

- **Restrictions:** (1) environmentally protected areas, (2) important aquifers, (3) surface water, (4) specific types of vegetation, (5) roads and railways, and (6) prohibited areas to construct commercial buildings;

- **Physical criteria:** (1) morphology, (2) orientation, (3) land use, and (4) visibility;

- **Environmental criteria:** (1) sensitive ecosystem, (2) water source, (3) surface water, and any (4) vegetation type;

- **Socio-economic criteria:** (1) infrastructure access, (2) population density, (3) residential area, and (4) tourism resource area.
Location Analysis

Location suitability evaluation
The concept and feasibility of the web prototype application demonstrated in the following procedure:

- Physical criteria
- Environmental criteria
- Socio-economic criteria
**Facade Color Analysis**

**External color measurement**
Single main colors were selected from walls and roofs to present the color of buildings based on the natural color system (NCS) chart.

**Internal color measurement**
The internal contrast of a colored surface is the variation in color existing between the central color value (mean) and the values of the rest of the surface in the basic channels of RGB.

**The NCS chart**
A standard color chart is a proprietary perceptual color model, which is published the Scandinavian Color Institute (Skandinaviska Färginstitutet AB).
**Façade Color Analysis**

**Color impact evaluation**
To calculate the color impact (CI), it is necessary to combine the number of HSB pairs with high contrast between a building (façade or roof) and its surroundings (the most dominant feature) and the magnitude of the internal contrast value between the central color value and the rest one.
* Façade Color Analysis

Color impact evaluation
**Conclusions**

- The methodology is an efficient approach to apply objective criteria for integrating rural buildings for urban and landscape design students in education for rural development towards sustainability and resilience.

- It is used to assess and predict the visual impact of rural buildings as taking into account the analysis of their location and façade color with a combination of various techniques.

- Students can learn sustainable and resilient rural development, particularly suitable building integration into a rural landscape.

- The proposed methodology can assist students seek a guideline to design and planning a rural building in their design studio.

- It could be also applied to different territorial contexts and construction types as a consulting and decision-making method for general design students.
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