PhD School on Agriculture, Environment and Bioenergy

(http://sites.unimi.it/dottorato_aab/)

(XXXVIII cycle, 2022-25)

Project draft

1.Field of interest

AGR/10 – Rural Buildings and Agro-Forest Land Planning; AGR/01 – Agricultural Economics and Rural Appraisal

2.Project title

Assessment of Ecosystem Services provided by green infrastructures and greenways in marginal mountain areas and their implementation in rural land planning and design, to promote the development of mountain areas.

3.Tutor Guido Sali

Co-tutors Giulio Senes e Natalia Fumagalli

4.Relevance of the topic and state of the art

Rural land planning and design methods and practices need to put more consideration to marginal mountain areas, as they are doing for other rural areas (Yarin et al., 2022; De Montis at al., 2017). The emerging planning approach to rural land planning is based on Green Infrastructures (GIs) and their relative Ecosystem Services (ESs) (Calia et al., 2021).

GI can be defined as "a strategically planned network of high quality natural and semi-natural areas with other environmental features, which is designed and managed to deliver a wide range of ecosystem services in both rural and urban settings. [...] One of the key attractions of a GI is its ability to perform several functions in the same area, in contrast to most 'grey' infrastructures, which usually have only one single objective [...] " (European Commission, 2013). In this regard, ES are "the benefits people derive from ecosystems" (MEA, 2005).

The Common International Classification of Ecosystem Services (CICES) identifies three groups of ESs (Haines-Young et al., 2018): supply (food, water, raw materials, etc.), regulation and maintenance (of the physical, chemical, biological conditions of the soil, water, air and habitats) and cultural (spiritual, identity, aesthetic and cultural values, recreation and tourism).

Despite the scientific recognition of the relevance of ESs of the GIs and their applications in urban and peri-urban context in the last decade (Albert et al., 2018), ESs and GIs do not inspire land planning and design policies and practices in rural mountain areas and their integration into traditional planning and design processes is still in its infancy.

Among the others, the evaluation of the cultural ESs of GIs is the least investigated topic, and only in recent years, scientific production has increased (Subramanian et al., 2019; Wang et al., 2021) but has mainly focused on the urban context. Cultural ESs assessment requires stakeholder involvement and the use of Multi-Criteria Decision Analysis (MCDA) tools (Langemeyer et al., 2016).

In this context, the goal of the project is to develop and validate a method for the assessment of the ESs provided by GIs and greenways in rural mountain areas, that can be fully integrated into the land planning and design processes.

5. Layout of the project (draft)

5.1.Materials & Methods

The project goal will be achieved through a series of research activities, particularly focused on two different study areas in the Alpine and Apennine zones:

- detailed identification of the cultural ESs of GIs and greenways;
- definition of the most suitable indicators, spatially referred, for their assessment;
- analysis of the ESs offered by the study areas through survey, mapping and creation of the GIS (Geographical Information System);
- analysis of the demand of ecosystem services by the local population, tourists and businesses, through stakeholders involvement (local community, local public bodies, managers of the environmental and territorial system, private companies related to primary production and touristic services) using different techniques (from questionnaires and focus groups, to participative "crowd mapping" using dedicated web-GIS technologies);
- assessment of the ESs offered by the study areas through the calculation of the spatial indicators previously defined;
- integration of ESs provided by GIs and greenways in the rural land planning and design practices of the study areas.

5.2.Schedule and major steps (3 years)

The research activities will be carried out in the 3 years of the project, according to the following general schedule.

- **First year**: literature review; identification of the cultural ESs of GIs and greenways; definition of the most suitable indicators for their assessment.
- **Second year**: analysis of the ESs offered by the study areas; analysis of the demand of ecosystem services by the local population, tourists and businesses.
- **Third year**: assessment of the ESs offered by the study areas; their integration in the rural land planning and design practices of the study areas; writing the thesis.

Activities	**1st year**				**2nd year**				**3rd year**			
Literature review												
Identification of ESs of GIs and greenways												
Definition of the most suitable indicators												
Analysis of the ESs offered by the study areas												
Analysis of the demand of ESs												
Assessment of ESs offered by the study areas												
Integration of ESs in planning and design												
Writing the thesis												

6. Available funds (source and amount)

PNRR Agritech – Spoke 7, Task 7.1.3: Euro 158.000,00

29960 - COLL_PR19GSENE_01: Euro 42.298,50

7. Literature

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