PhD School on Agriculture, Environment and Bioenergy

(XXXIV cycle, 2018-20)

Project draft

1.Field of interest

Agroecology, sustainable and multifunction agriculture, contribution of landscape bionomics, Sustainability and its indicators, frameworks for sustainable farming systems

2.Project title

Agroecology and Landscape bionomics for a qualified design and sustainable management of territorial resources

3.Tutor

Prof. Stefano Bocchi

4.Relevance of the topic and state of the art:

The so called Industrial Agriculture allowed, on one hand, to increase the yields of some crops in several areas of the planet, but, on the other hand, pollution and landscape degradation were in the same areas emerging problems, connected to the most spread out intensive agro-techniques. Agroecology may change the current situation by reversing completely the approach and applying a completely upgraded scientific principles and practices for increasing yields and significantly reducing negative impacts.

Agroecology recognizes that Life on Earth is hierarchically organized in systems, acting as living entities, organized in different complexity scales (cropping, farming, agricultural systems). Despite the ongoing dispute on the history of agroecology, which is geographically biased (Europe vs Latin America), the fact that agroecology is at the same time (i) a science, (ii) a practice, and (iii) a movement is generally accepted. These three souls share the vision of undertaking the transition towards truly sustainable agricultural and food systems on a planetary scale. A key concept in agroecology is that this transition can only be possible by taking an agri-food system approach, i.e. by sustaining not only innovation of agricultural practices but also a profound change in resources (land, water, biodiversity) accessibility, labour requalification, landscape rehabilitation, food distribution, and food consumption patterns. By reconnecting farmers with consumers through the support of local healthy food production and short food supply chains (e.g. Community Supported Agriculture schemes), agroecology aims to create new job opportunities, increase farmers' income, prevent agricultural land abandonment, revitalise countryside, and facilitate knowledge sharing. This will result in better environmental protection, economic prosperity and social cohesion, and will meet most of the 17 UN Sustainable Development Goals. This new approach requires new research, new appropriate indicators and new frameworks for indicator application, as stressed clearly by the future CAP 2021-2027.

5.Layout of the project (draft)

5.1.Materials & Methods:

The study will be carried out at different scale levels of Regional (Lombardy, Italy) and Local (some farms, Lombardy). Different sustainability indicators inside a framework (i.e. SAFA) and some bionomic indicators (i.e. BTC Bionomics Territorial Capacity, agroecological indicators based on biodiversity) will be calculated and used. Data will be recovered from different data-base or recovered from new research activity carried out during the three-year period. Particularly studied will be carried out at farming system level, for comparison of farming (organic farming vs conventional ones) or cropping system (varieties managed differently) typology . Some others tools for assessment (i.e. LCA) will be applied for a better evaluation of the new approach. The focus will be farming systems producing rice and looking for sustainability.

5.2.Schedule and major steps (3 years):

First year: literature analysis for individuating indicators and framework focused on sustainability assessment. Data recovering and organization of a geo-data base. First GIS modeling. Case-study selection, mainly related the local scale (farms producing rice)

Second year: Data recovering and modeling (GIS, LCA) first assessing and comparison. Comparison of different rice varieties cultivated in different agronomic regimes. Scientific paper preparation and submission to International Journal.

Third year: multiscale assessment of agro-food systems (from regional to local) through statistical analysis, modeling, comparisons using. Final Report

6. Available funds (source and amount)

Funds available from some past projects: 15.000 euros

6. Literature:

Bocchi S. 2017. The yield in the context of industrial versus Sustainable Agriculture. More food: road to survival. In Pilu and Gavazzi Eds. Bentham Sci Publ.3-21.

Bocchi S.; Maggi M., 2014. Agroecologia, sistemi agro-alimentari locali sostenibili, nuovi equilibri campagna-città, 2014, Press n. 2, pp. 95-100 Firenze University

Bocchi S. Ingegnoli V. The Crucial Contribution of Bionomics to Agroecology from Farming-Systems to Agricultural Landscapes. Sustainability, in press, June 2018.

Gliessman SR. Agroecology, The ecology of sustainable food systems. 2015 CRC Press, London, New York.

Ingegnoli V. Bocchi S. 2018. Agricultural landscapes rehabilitation suggests ecosystem services updating. WSEAS transactions on Environ. and Develop. 14:233-241.

Lancet Commission on Planetary Health. Safeguarding Human Health in the Anthropocene epoch: report of the Rockfeller Foundation-Lancet Commission on Planetary Health. The Lancet, July 2015.

Nita A.; Buttler A.; Rozylowicz L.; Patru-Stupariu I. Perception and use of landscape concepts in the procedure of Environmental Impact Assessment: case study-Switzerland and Romania. Land use Policy, 2015, 44, 145 – 152

Wezel A. et al. 2009. Agroecology as a science, a movement and a practice. A review. Agron. Sustain. Dev. 29:503-515.