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Bioregional Planning and Design: Volume II

Issues and Practices for a Bioregional Regeneration

Springer

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Contents

Agroecology: Relocalizing Agriculture Accordingly to Places

Stefano Bocchi

1 *Green Revolution* (GR) Features, Dynamics, and Consequences: Delocalization of Farming

The green revolution, generated by the USA during the 1940s, reached Europe only after the Second World War, and a new production/consumption model replaced in few decades most of the diversified, place-based, culturally rooted agro-food models previously developed in the territories.

The prototype of Green Revolution adopted was an innovation model concentrating big amount of resources in few places (research centers, universities) aiming at reaching the main goal: increase the productivity of some crops (mainly cereals) for decreasing the risk of famine and its consequences.

The first scheme of this innovation was simply and linear: by giving funds and facilities to few breeders, genetists, and specialized agronomists, they would have delivered new varieties of wheat (*Triticum aestivum* or *durum L.*), corn (*Zea mays* L.), rice (*Oryza sativa* L.), etc., and in turn, these would have increased productivity and global productions, so improving *food supply*. Genetics was elected as principle leverage inside this paradigm, mainly industrially based in terms of simplified model, strategy, organization, and use of resources, control mechanism, evaluation methods, and indicators. Genetists have been designated to create in a limited time the so-called high-yielding varieties (HYV), through breeding processes carried out not on farm but in selected and limited places (decontextualized sites as laboratories, greenhouses, plots of the research centers), with soil conditions maintained at high levels of availability of nutrients (the main principle crop nutrients: nitrogen, phosphorus, potassium NPK). None of the nutrients should have negatively affected the yields of the HYV in the experimental conditions where the potential yields were

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D. Fanfani, A. Matarán Ruiz (eds.), *Bioregional Planning and Design: Volume II*,
https://doi.org/10.1007/978-3-030-46083-9_5

Table 1 Main features of the industrial agriculture proposed by Green Revolution during the last six decades all over the world

Disconnection from natural cycles, fluxes, feedback processes (decontextualization)
No limiting factors in agriculture production (overcoming Liebig theory)
Sectorializing
Focus on commodities for global market
Focus on technologies, mainly genetics but also chemical and mechanical
Upgrading of dimension as dominant trend (big/large farm is better than little farm)
Intensification as technological function (more factors form/for global market)
Specialization (farm, research) Disconnecting past-present-future
No linkages between farm and territory (place independency strategy)
External and specialized research
Privatization of the resources and unequal distribution of richness

Source Bocchi (2017)

evaluated. The idea was to reduce the effect of variability of the soil on the productivity (no limiting factors related to nutrient availability) so reaching a sort of uniformity of the behavior of the cultivar. One-size-fits-all, for example, a new hybrid of corn created in Missouri, would have been suitable for the pedoclimatic and market conditions of Lombardy in Italy, along with a global flow of convergence technology suitable for the industrial sector requiring standardization of products, goods, and commodities. At the same time, the global market was also requiring standardization, not foods with peculiar features but commodities for global exchange. In this way, cereals have become undifferentiated goods, like iron, steel, and petrol. This was the first deep delocalization of agriculture and its products. By assuming the nonlimited availability of NPK, the new HYV would have been more productive than the older varieties, for example, a Ferrari car is faster than a popular, cheap car. The direct effect of the adoption of HYV was well analyzed and promoted. The implications and indirect effects are defined as follows:

The implications: Ferrari car (like HYV) requires specific circuits for performing, fuel for feeding the powerful engine, money for assuring the mechanical system maintenance, and so on. So, the new model of machine/crop would have been suitable for some standardized conditions but quite far from the most common farmers: a wonderful machine, an innovative product, in a new industrialized modern world but not linked to the local realities in terms of pedoclimatic, market, social-economic, and legislative conditions.

Indirect effects: Since the main, unique goal was to increase the yields (the direct effect of the adoption of the HYV), few indirect effects of the industrial model have been considered, and in the following decades, both negative economic and environmental impacts would have increasingly become evident, differently at local level (Bocchi 2017) (Table 1).

The farmer should have continuously and increasingly had to buy from the global market fuel, fertilizers, pesticides, and machines starting from the requirements of

Table 3 From industrial agriculture to agroecological local agro-food models. Tools for designing localized sustainable agro-food systems

Specialized industrial agriculture	Agroecology-based local agro-food systems
Specialization: The current socioeconomic paradigm forces producers to specialize in the production of a single or few items (sometimes a single stage of production). Industrial agriculture is designed as industrial processes in terms of scale and task segregation, seeking productivity gains from specialization/intensification of production	Diversification: To maintain multiple sources of production and vary in space and time at farm/landscape level, maximizing biodiversity for stimulating positive interactions between different species
Disconnections from natural cycles, fluxes, and feedback processes	Connection with natural cycles, fluxes, feedback mechanisms
No limiting factors in agriculture production (overcoming Liebig theory)	Consider local limiting factors
Sectorialization	Local integration among sectors
Focus on commodities for global market. Trend to increase volumes of homogenous products for (national) international long value chain markets	Focus on products and ecosystem services for local markets/short value chains. Production of a wide range of less homogeneous products/outputs; farming with multiple sources of production, income, and livelihood
Focus on technologies (genetics, chemical, mechanical)	Focus on technologies based on local knowledge and capabilities
Upgrading of dimension as dominant trend (big farm is better than little farm)	Cooperation, creation of associations, local districts
Intensification as technological function (more factors form/for global market). Highly mechanized, labor-saving production systems	Intensification based in quantity and quality of labor. Labor-intensive systems
Specialization (farm, research)	Multifunctionality, multisector, interdisciplinarity
Crop monocultures (or production of a handful of selected crops) at the level of farms or landscapes: concentrated animal feeding operations (CAFOs)	Temporal diversification (e.g., crop rotation) and spatial diversification (e.g., intercropping; mixed farming); diversification employed at various levels, including plot, farm, and landscape locally identified and managed
Intensive use of external inputs, e.g., fossil fuel, chemical fertilizers, pesticides, and antibiotics	Low external inputs; recycling of waste within full nutrient cycling and circular economy approaches
Use of genetically uniform varieties or breeds selected mainly for high productivity, wide adaptability to favorable environments, and ability to respond to chemical inputs (IPES 2016)	Use of wide range of species and less uniform, locally adapted varieties/breeds, based on multiple uses (including traditional uses), cultural preferences, taste, productivity, and other criteria (IPES 2016)
Disconnecting past-present-future	Connecting past, present, future
Vertical and horizontal segregation of supply chains, e.g., animal feed production and animal rearing in separate farms, value chains, and regions (IPES 2016)	Natural synergies adopted and supply chain typologies integrated (e.g., mixed crop-livestock-tree farming systems and landscapes)
Neutral, no values and ethics	Priority to local values, material and immaterial

(continued)