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Understandings of agroecology in China

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SUMMARY

While there is no single definition of agroecology, understandings of the concept are converging across different geographical contexts. In China, the concept is used in an inclusive manner, encompassing agricultural practices that emphasize ecological sustainability, biodiversity conservation, and socio-economic equity. A definition by the Chinese Ministry of Agriculture and Rural Affairs describes ecological farms as those using ecological principles to obtain maximum yields while achieving sustainable use of resources, environmental friendliness, and food safety. The breadth of practices that can be subsumed under the concept of agroecology are a symbol of its strength and vitality.

non-point source pollution as China has emerged as the largest consumer of agricultural fertilizers, accounting for 22.65% of the world's total fertilizer use.³ Addressing the ecological damage caused by unreasonable use of chemical inputs, China has focused on ecological agriculture as an important pathway for more sustainable and environmentally friendly production modes.⁴

Definition and connotations

Background

With an agricultural tradition going back more than 4,000 years, China boasts a wealth of sustainable agricultural practices—from diversified crop cultivation and rotation systems to the integration of crop and livestock farming, irrigation and drainage, as well as terracing.¹ Today, food security is a top priority in national politics in China. High yields securing greater self-sufficiency are a main objective in agricultural production, also postulated in various policy documents. This is usually connected with the promotion of technological innovations and the modernization of agriculture—often at the cost of natural resources like soil and water. Following a series of agricultural industrialization reforms, China's agricultural input-output structure has also undergone significant changes, with rapid growth in grain production, increasing from 113 million tons in 1949 to 687 million tons in 2022.² However, the growth in grain production driven by input increases has also led to serious agricultural

According to Luo Shiming, the subject “agroecology” was first mentioned in an article as early as 1975, and the topic has continued to be in the focus of a multitude of publications that have followed. The meaning of buzzwords often gets watered down over time. It, therefore, will be helpful to get a clearer understanding of the definition and its evolution as well as the relevance of this term in the Chinese context.

The Chinese term 生态农业 *shengtai nongye* was initially translated into English as “ecological agriculture” and has also been rendered as “eco-agriculture”, “agricultural ecology”, and “agroecology”. In recent years, the term “agroecology” has been widely adopted by North America, the European Union (EU), Latin American countries, and FAO. The term commonly highlights three interrelated aspects, namely “agroecology as a science, a practice, and a social movement”.⁵

¹ WITTEW S H. *Feeding a Billion: Frontiers of Chinese Agriculture* [M]. East Lansing: Michigan State University Press, 1987.

² National Bureau of Statistics. <https://data.stats.gov.cn/>.

³ LI C, WAN D W, XU X B, et al. Anti-substitution effect of coupling crop and livestock production on fertilizer use: Evidence from Chinese smallholder farms [J]. *Journal of Cleaner Production*, 2023, 412: 137359.

⁴ LEIPPERT F, DARMAUN M, BERNOUX M, et al. *The Potential of Agroecology to Build Climate-Resilient Livelihoods and Food Systems* [M]. Rom: Food and Agriculture Organization of the United Nations, and Biovision Foundation for Ecological Development, 2020.

⁵ WEZEL A, BELLON S, FRANCIS C, et al. Agroecology as a science, a movement and a practice: A review [J]. *Agronomy for Sustainable Development*, 2009, 29: 503-515.

By contrast, in the Chinese context, “ecological agriculture” or 生态农业 *shengtai nongye* refers to the agricultural practice, while the term “agricultural ecology” denotes the scientific field, and the term “social agricultural ecological transformation” describes the process of social transformation. Although there is no definition of ecological agriculture shared by all actors and across all contexts, understandings of the connotations of the concept have been gradually converging.

In China, the concept of “ecological agriculture” embodies the principles of ecological sustainability, biodiversity conservation, and socio-economic equity. In 1981, the renowned Chinese ecologist Ma Shijun proposed that agriculture based on the principles of “integrity, coordination, circulation, and regeneration” constitutes ecological agriculture.⁶ In the textbook *Agricultural Ecology or Agroecology*, ecological agriculture is defined as a sustainable agriculture development approach that actively employs eco-friendly methods to comprehensively enhance the service functions of agro-ecosystems.⁷

The practice of ecological agriculture aims to:

- integrate grain production with the cultivation of various cash crop,
- integrate crop farming with forestry, animal husbandry, sideline industries, and fisheries,
- utilize the essence of traditional Chinese agriculture and modern scientific technology,
- artificially design agricultural ecological projects,

- coordinate the relationship between agricultural production and the environment, resource utilization, and protection,
- form a virtuous cycle of ecology and economy,
- achieve sustainable development of agriculture,
- achieve unity of economic, ecological, and social benefits.⁸

The *Technical Specifications for the Evaluation of Ecological Farms*, issued by the Ministry of Agriculture and Rural Affairs (MARA) in 2020, provide the latest definition for ecological farms. According to the *Specifications*, **ecological farms use ecological principles to obtain maximum yields while achieving sustainable use of resources, environmental friendliness, and food safety.** To this end, ecological farms follow the principles of “integrity, coordination, circulation, regeneration, and diversity”. They use a comprehensive design and rational construction, adopt a series of sustainable agricultural technologies that close material and energy cycles between biotic and abiotic environments, and scientifically and reasonably combine and manage agricultural and bio-environmental systems.⁹

The concept of ecological agriculture has broad inclusiveness. As long as the three “red lines” of resource depletion, environmental pollution, and unsafe food are not crossed and the state of “sustainable use of resources, environmental friendliness, and food safety” is maintained, no matter which aspect of agriculture is emphasized or what it is called in the specific implementation

⁶ ZHAO G S. Modernization of China's eco-agriculture: connotation, task and path [J]. *Chinese Journal of Eco-Agriculture*, 2023, 31(8): 1171–1177.

⁷ LUO S M. *Agroecology* [M]. 3rd ed. Beijing: China Agriculture Press, 2017.

⁸ GAO S B, SONG C J, XU Z Y, et al. The development space of and recommendations for ecological farms in China [J]. *Chinese Journal of Eco-Agriculture*, 2021, 29(10): 1733–1741

⁹ Ministry of Agriculture and Rural Affairs of the People's Republic of China. Technical specification for the assessment of ecological farm [EB/OL]. [2023-10-10]. <https://www.yun-cheng.gov.cn/upload-files/202203/24/2022032415204639999690.pdf>.

process, it actually belongs to the category of ecological agriculture.¹⁰ At different stages and under different scenarios of agricultural ecological transformation, stakeholders will use different terminology. For example, when emphasizing the carbon balance, the term “low-carbon agriculture” is adopted; when emphasizing ecological iconic colors, “green agriculture” is adopted; when emphasizing system circulation, “circular agriculture” is adopted; when emphasizing environmental source governance, “agricultural clean production” is adopted; and when emphasizing adaptation to climate change, “climate smart agriculture” is adopted. All these concepts are aligned with and can be included in the concept of ecological agriculture. The emergence of numerous behaviors with consistent goals highlights the strength of the concept of ecological agriculture. While ecological agriculture clearly sets itself apart from practices resulting in resource depletion, environmental pollution, and the violation of food safety, it is at the same time an inclusive concept that accommodates multiple agroecological goals—from reducing chemical inputs and carbon emissions to improving resource circularity.¹¹

Development and evolution

Chinese traditional agriculture maintains soil fertility and prevents pests and diseases by practices such as growing legume crops and green manure, recycling crop residues, composting, terracing, implementing crop rotation, intercropping, and diversifying crop species. These practices form different Globally Important Agricultural Heritage Systems

(GIAHS) such as integrated fishpond systems and rice-fish farming systems and have effectively maintained soil fertility and agroecosystems under intensive cultivation conditions for thousands of years.¹²

The late 1970s to early 1990s marked the initial exploration stage for modern ecological agriculture in China.¹³ The concept of “Chinese ecological agriculture” was proposed in academic circles, and small-scale experiments were conducted while several village-level ecological agricultural practices were initiated nationwide. In the 1990s, MARA launched the construction of 120 ecological agriculture pilot counties in two phases nationwide, with over 1,000 ecological agriculture pilot projects carried out in various regions.¹⁴

Since the 21st century, China's ecological agriculture construction has entered a new stage. In 2006, the *Document Number One* for the first time mentioned “actively developing circular agriculture”. Since 2014, the Agricultural Ecological and Resource Protection General Station of MARA has further organized the construction of 13 ecological agriculture regional demonstration bases and conducted investigations on over 100 typical ecological farms nationwide, publishing the *Report on Investigation of Chinese Ecological Farm Cases* in 2018.¹⁵ In 2020, MARA issued the *Technical Specifications for the Evaluation of Ecological Farms*, providing standard criteria for evaluating ecological farms. The *Specifications* further proposed to “build 1,000 national ecological farms nationwide by 2025” and called on provincial governments to “build 10,000 local

¹⁰ Luo Shiming. Review and Prospect of Ecological Agriculture Development [J]. *Journal of South China Agricultural University*, 2022, 43(04):1-9.

¹¹ Ibid.

¹² Theresa Schumilas. Alternative Food Networks with Chinese Characteristics, 2014, UWSpace. <http://hdl.handle.net/10012/8817>.

¹³ XU Xiangbo, XU Rong, ZHANG Linxiu et al. Eco-farm construction under the development of ecological agriculture:

History, progress and prospect [J/OL]. *Chinese Journal of Ecological Agriculture*, 1-14 [2024-03-15]. <http://kns.cnki.net/kcms/detail/13.1432.S.20240301.1740.003.html>.

¹⁴ Ibid.

¹⁵ Gao Shangbin, Li Ji, Qiao Yuhui, et al. *Eco-farming in China* [R]. Beijing: China Agricultural Press, 1980.

ecological farms". From 2021 to 2023, a total of 776 applicants were awarded the title of national ecological farm after evaluation.

Current state and comparison with European understanding

Agroecology has gained increasing recognition and relevance in China's agricultural development strategy, particularly in the context of addressing pressing environmental challenges such as soil degradation, water pollution, and biodiversity loss. The adoption of agroecological practices has led to tangible benefits for farmers, including improved soil health, increased crop resilience to pests and diseases, and enhanced food security. Agroecology also aligns with global efforts to promote sustainable agriculture and mitigate the impacts of climate change, making it a critical component of China's broader sustainable development agenda.

While both China and the EU advocate for ecological agriculture, there are notable differences in their approaches and priorities. As for the definitions, China emphasizes local adaptation, resource efficiency, and holistic management, while the EU emphasizes principles like resilience, social equity, and co-creation of knowledge.

For agroecology practices, China's ecological agriculture integrates traditional wisdom with modern techniques, focusing on enhancing soil health, biodiversity, and ecosystem services. In contrast, the EU emphasizes input reduction, soil health, biodiversity conservation, and economic diversification. For policy implementation, China has initiated large-scale national programs and targets for ecological agriculture development, including the establishment of eco-farming demonstration bases and evaluation standards. In comparison, the EU has implemented various policies and initiatives to promote sustainable agriculture and food systems, including subsidies for organic farming and agroecological practices.

In summary, while both China and the EU share common goals of promoting ecological agriculture for sustainable food systems, they adopt distinct approaches and strategies tailored to their respective contexts and priorities.



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