

Science on Land Suitability Serves Health-Oriented Life

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Abstract: As China's society enters in a new era of socialism with Chinese characteristics, the people's growing need for a better life and unbalanced and inadequate development have become the principal conflict in society, and a high quality of life oriented towards health as a demand is an important part of the need for a better life. Health is an inevitable requirement for the comprehensive development of human beings, a basic condition for economic and social development, an important symbol of national prosperity and national strength, and the common pursuit of the general public. However, health problems such as the increasing prevalence of chronic diseases, overcrowded hospitals, and the high incidence of tumors and cancers are a constant threat to the well-being of the people's lives, and the root lies in the irrational use of resources by human beings leading to the unhealthiness of the natural ecosystem. The pursuit of a high quality of life requires a shift from having enough to eating well, a scientific policy system that takes science on land suitability as a holistic solution, geographic indication products as flagship representations, and territorial spatial governance as a guarantee.

Keywords: science on land suitability; health; geographic indication product; land spatial governance

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1 Introduction

Human and environment are the life community, and nature is the basic condition on which mankind depends for its survival and development. Without the health of the whole people, there will be no overall well-off society. Against the background of great improvement in people's living standards and great material abundance, the pursuit of a high-quality life needs to shift from having enough to eating well. At the same time, it should be recognized that behind high-quality life and high-quality development is a scientific policy system with science on land suitability^[1] as a holistic solution, Geographical Indication products as flagship representations, and the guarantee of the territorial spatial governance.

2 Health-orientated Life

2.1 The Connotation of a Health-orientated Life

A high-quality life is a life with a more enrich, secure, and sustainable sense of gain,

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happiness and security. Healthy human body consists of seven nutrients, including water, protein, fat, minerals, vitamins, carbohydrates and fiber, which play their respective roles to maintain human health. Technological progress has created new fashions, easy access to material products, spiritual products, and ecological products, meanwhile, it has led to fragmented time and fragmented reading, leading to fragmented access to information, quality, classic, and natural but gradually far away, light civilization, slow life, deep breathing, and total nutrition have been gradually forgotten.

2.2 From Full to Well-fed

As China enters a new stage of development, the people's demand for food has become more diversified, shifting from zero hungry to food health or eating well. How to eat more assuredly, more nutritious, and safer is the new pursuit and goal. Food safety is a systematic project, not only involves agricultural products, pesticides, seeds, and other sources, but also involves the industries such as food production, processing, packaging, sales, and catering services. To guard the every bite of food is safe, we need scientific co-management, joint efforts, from the farm to the table of every line of defense^[2]. In 2021, the first closed-loop food safety traceability management system—"Zhejiang Food Chain" was online and running in Zhejiang. Through scanning code can provide consumers and regulators with food production, sales, and other information, for protection food safety supervision and food safety consumption.

To eat well, the first thing you need to do is to learn to eat and drink scientifically and reasonably to prevent hidden hunger. The Dietary Guidelines for Chinese (2022) recommends eight core guidelines: food variety, reasonable combination; balanced eating and sport, healthy weight; eating more vegetables, dairy, whole grains, soybeans; moderate amount of fish, poultry, eggs, lean meat; less salt, less oil, controlling sugar and alcohol; regular meals, drinking enough water; knowing how to cook, knowing how to choose, knowing what about the labels; public chopsticks and share the meal to eliminate waste^[3]. And, eliminate fake products, resist inferior products, ensure the supply of good products, and share superior products. It is a fact that the nutritional content of food has declined as a result of industrialized agriculture. Increasing environmental pollution, excessive use of chemical fertilizers, pesticides, ripening agents, etc., are resulting in the loss of soil nutrients, which directly reduces the nutritional value of food, increasing pesticide residues, resulting in a change in the flavor of the food, and improving the health risk. Due to nutritional imbalance or lack of a certain or part of the nutrient elements, while excessive intake of other nutrients, resulting in hidden nutritional needs rather than satiety aspect of the phenomenon of insufficient volume, is known as hidden hunger^[4]. Data shows that in 2016, there was more than 2 billion people in the world in hidden hunger. At present, the population in China with hidden hunger reaches 300 million people, which is one of the countries facing the serious challenge of hidden hunger. Now the nutritional composition of food is not as good as it used to be, data shows that the nutritional elements of an orange is 1/4 less than that of an orange 50 years ago; the amount of vitamin A in 100 g of carrots was 13,500 IU in 1950, and it was reduced by 67% to only 4,050 IU in 1982, and the vitamin A in carrots had plummeted to 5%–12.5% of the amount in carrots 50 years ago by 2002. Spinach in 2009 had 70% less vitamin C than that had in 1963. Hidden hunger is a state that is difficult to recognize, but it is easy to ignore and affect health. Modern medical science has proved that chronic diseases such as diabetes, cardiovascular disease, cancer, obesity, sub-health and other chronic diseases are all related to the imbalance of the body's intake of nutrients, threatening people's health and life.

Eating well requires more attention to the source of food—soil. Zhu, Yongguan, an academician of the Chinese Academy of Sciences, said, "People who play with soil are healthier. If the microbes on a child's skin are more diverse, the immune system will be stronger". The experiment, by dividing 75 children aged 3 to 5 into three groups and exposing them to different environments, indicated that the gut bacterial flora of children who were active in greenery and forests were healthier than those in kindergarten environments, and that the diversity of microorganisms in the soil helped the children to build a better immune system, and this experiment also proved that children exposed to mud have better immunity^[5]. Jiang, Gaoming has developed the model of eco-agriculture, which in the entire planting process,

pesticides, chemical fertilizers, mulch, hormones, herbicides and genetically engineered seeds are not used at all, and physical or biological technologies are used instead of chemical technologies, and the food produced meets the European Union and China organic certification standards. The model has six effects: (1) agricultural productivity harvest; (2) increase farmers' income; (3) environmental protection; (4) carbon sequestration and nitrogen increase in cultivated land; (5) to help protect the seeds; (6) reduction in the number of hospital patients. Soil is the skin of the earth, only when the soil is healthy, the earth can have vitality and human beings can survive and develop healthily.

3 Science on Land Suitability Supports Healthy Life

3.1 Science on Land Suitability and Geographical Indication Products

The main food for human beings comes directly or indirectly from cultivated land. With the changes in the level of people's demand for food, the use of cultivated land in China has been shifted from the traditional focus on improving food production to that focuses on improving the quality and health value of agricultural products, which needs to be supported by the science of land suitability. The concept of land suitability has been clearly expressed in the ancient times. Modern science on land suitability is an applied technology discipline, which focus on regional famous agricultural (livestock) products economic and biological traits of physiology and its stage of development on the land ecological requirements and corresponding management measures as the main research content, including the connotation of land suitability and regional brand products of land ecological requirements^[7]. With the demand for land management and the development of science and technology, the science of land suitability has gradually developed into two categories: land suitability evaluation for land use management^[6] and habitat suitability evaluation for biodiversity conservation^[7], and the research methodology has gradually evolved from survey and sampling to the development of new technology and new methodology including GIS^[8] and modelling^[9]. However, there is still insufficient attention to the suitability of "local specialties" with unique regional traits^[10,11]. With the development of the scientific theory of land suitability, the knowledge of geo-ecological value of products with typical climate, location and soil characteristics will be deepened, and the natural value, geographic value, and ecological value they contain will be realized. Brand agricultural products and geographical indications products are typical examples of the realization of the value of products with special characteristics by the science of land suitability.

Brand Agriculture is developed on the basis of the scientific theory of land suitability. Brand Agriculture is the key part of modern agriculture, with quality as the foundation and characteristics as the key, with five characteristics: ecology, value, standardization, industrialization and capitalization, of which ecology is the heart of brand agriculture; value is the face of brand agriculture; standardization is the blood of brand agriculture; industrialization is the limb of brand agriculture; and capitalization is the guarantee of brand agriculture. By the end of 2021, more than 59,000 green, organic, and geographical indications of agricultural products were recognized nationwide, and a total of 308 characteristic agricultural product advantage zones and 100 advantageous characteristic industrial clusters were created and recognized^[12].

Geographical Indications Products are the flagship symbols of the science of land suitability. On 14 September in 2020, China and the European Union signed the first bilateral agreement on the protection of geographical indications products, the Agreement between the Government of the People's Republic of China and the European Union on the Protection of Geographical Indications Products and Co-operation in the Field of Geographical Indications Products. On 16 September in 2021, China formally applied for membership in the Comprehensive and Progressive Agreement for Trans-Pacific Partnership, which embodies the protection of geographical indications products and promotes the certification and protection of Chinese geographical indications products. Geographical indication agricultural products have a unique display in terms of geographical environment, production methods, and cultural heritage, and play an irreplaceable role in promoting rural industrial revitalization. According to the data, by the end of 2022, China has cumulatively protected 2,495 geographical indications products, more than 23,000 market entities have used the special mark for geographical

indications products, 7,076 pieces of geographical indications products have been registered as collective trademarks and certification trademarks, and China and Europe have cumulatively realized mutual recognition and mutual protection for 244 products.

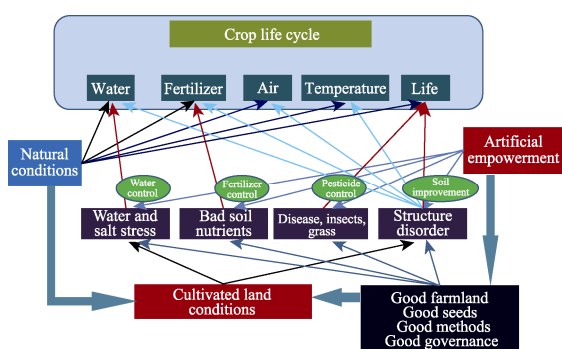


Figure 1 Balance between natural conditions and artificial empowerment

nutrient deficiencies, pests, weeds, and structural barriers by controlling water, fertilizers, pesticide, and soil improvement to improve the quality of cultivated land, create ecologically productive farmland, and produce high-quality agricultural products with regional characteristics, in which good farmland is the basis, good seeds is the heart, good methods is the key, and good governance is the guarantee (Figure 1).

3.2 Spatial Security for Healthy Life

Healthy life and even high-quality development is essentially a behavior on spatial, which requires high-quality land spatial governance as a guarantee, and urgently needs to be planned as a whole and promoted systematically from the four aspects of cognition, planning, action, and project. Establishing a community of life between man and nature, common cognition of the environment, the Kunming Declaration continues our future vision of biodiversity protection; promote the construction land spatial planning and management pattern; all-round, all-territory, and all-process protection, remediation, restoration the elements of land, and systematic governance. Efficiently promote the synergistic effect of reducing pollution and carbon emissions, as well as continue to accelerate the implementation of the integrated protection and restoration project for community of life.

The guarantee of land for a high-quality and healthy life should be based on the premise of the scientific knowledge of science on land suitability. Man and nature are a community of life, and mankind must respect, adapt to, and protect nature. Nature creates the environment and conditions suitable for the survival of life on earth, and creates various biological species as well as the entire ecosystem. Humans are an important part of nature and depend on the materials of production and life provided by nature. The ecological environment is the basic condition for the survival and development of human beings and the sustainable development of society. It is necessary to implement the concept of green development, promote the transformation of green development, abandon the pattern of growth at the expense of the environment, realize the awareness and principle of nature resource conservation and environmental protection in the spatial pattern, industrial structure, production methods, and lifestyle, and take the carrying capacity of natural resources and the ecological environment as a prerequisite, so as to give the natural ecosystem time and space to restore. The Aichi Targets is a global action for biodiversity conservation formulated by the international community between 2010 and 2020 to cope with the serious situation of biodiversity loss, but none of the 20 action targets in its biodiversity targets has been fully achieved, and only six targets have been partially achieved, alerting for biodiversity conservation. As one of the world's most biodiversity-rich countries, China has carried out a series of biodiversity conservation measures and actively promoted the release of the 2021 Kunming Declaration, which has reached an agreement on reversing the current status quo

of biodiversity loss and promoting the post-2020 Global Biodiversity Framework, which provides guiding and feasible pathway planning and programs, and is of great importance to the biodiversity conservation. It is of great significance as a nexus milestone.

Scientific and reasonable spatial planning is the basis for the spatial guarantee of high-quality and healthy living. Territorial spatial planning is a guide for national spatial development, a spatial blueprint for sustainable development, and a basic for all types of development and construction activities, as well as a spatial and temporal arrangement for the development and protection of territorial space in a certain region^[15]. The realization of multi-planning, through the overall planning, detailed planning, and relevant special planning, the implementation of multi-level planning, for the optimization of the pattern of territorial spatial development, the improving quality of development, the order of the principles, as well as the realization of the beautiful China, to provide the base foundation. It is also accelerating the implementation of land and sea, urban and rural, aboveground and underground spatial integration, and promoting the construction of a “one blueprint” territorial spatial management pattern.

The spatial guarantee of a high-quality and healthy life relies on specific actions such as land consolidation, ecological restoration, and pollution and carbon reduction. Comprehensive land management and ecological protection and restoration adhere to the strategic initiative of ecological civilization, take the optimization of the land development pattern as an opportunity, increase the strength of natural ecosystems and environmental protection, and take a balanced approach, apply a holistic policy, and take multiple measures to protect, manage, and restore the spatial elements of the land in an all-encompassing, all-sites, and all-process way, so as to systematically manage the life community. Expanding the object of remediation and restoration to the all elements of national space, based on the “four zones and one belt” pattern, promoting the remediation, protection, and restoration of the entire territory and the entire river basin, coordinating the time and space, and integrating the whole area of the sea, land and air, to form a vertically unified, horizontally linked, combination pattern. Treating the mountains, water, forests, farmland, lakes, and grasses as a life community, and stressing that the integrated consideration of all natural ecological elements is consistent with the concept of ecological civilization, and are the important grip for landing ecological civilization, and the important means to enhance the efficiency and quality of spatial development and optimize land. Problem-oriented, respecting nature, gradually changing from engineering governance thinking to that based on natural restoration supplemented by necessary engineering measures, strengthening the joint efforts among natural resources, ecology, agriculture, rural areas and water conservancy, and shifting from localized to systemic governance. In 2022, a plan was issued called the “Implementation Plan for Synergistic Effectiveness of Pollution Reduction, Carbon Reduction”, which makes systematic deployment to promote the synergy of pollution reduction and carbon reduction. The plan puts forward important tasks and initiatives in six parts: strengthening prevention and control at source, highlighting key areas, optimizing environmental governance, developing model innovation, strengthening support and guarantee, and enhancing organizational implementation. Focusing on the construction of a beautiful China and the goals of carbon peak and carbon neutrality, the plan integrates the emission reduction requirements in multiple areas such as the atmosphere, water, soil, solid waste, and greenhouse gases, and organically connects the goals of pollution reduction and carbon reduction. The implementation of coordinated management of pollution reduction and carbon reduction requires the promotion of pilot projects at multiple levels and in multiple fields, the scientific evaluation of the relevant effectiveness, the strengthening of basic capacity-building, and the formation of an efficient and coordinated working pattern of pollution reduction and carbon reduction in society as a whole.

The spatial guarantee of a high-quality and healthy life still needs to be ensured by the implementation of the project. COP15 announced that China’s Shan-Shui Initiative had been selected as one of ten recognized pioneering ecological restoration projects of the United Nations. The total area of ecological restoration in the Shan-Shui project area exceeds 68 million ha, while creating nearly 15 million jobs, providing Chinese solutions and wisdom for global biodiversity conservation. The Initiative has changed the previous restoration mode of single

target or single ecological element, starting from the concept of entire ecosystem protection, systematic restoration and comprehensive management, based on the scientific and efficient five-level and three-type land planning system, and introducing a series of standards to provide technical guidance for project implementation. Mountains, water, forests, farmland, lakes, grasses, and sands are a multifaceted environmental system, which is organically linked to each other, and requires comprehensive consideration about the integrity of the natural geographic unit, the relevance of the ecosystem and the comprehensiveness of the natural ecological elements, and coordinated implementation of the project on a regional or watershed basis, with emphasis on the entire protection, systematic restoration, and comprehensive management of the various types of natural ecological elements within a certain area.

4 Conclusions

The root of health lies in a healthy ecosystem, and geographical indications products provide a direction for us to aspire to a high-quality life. As we deepen our knowledge of the life community, under the guidance of science on land suitability and the guarantee of the “one blueprint” of land planning, we will promote the comprehensive improvement of land and ecological restoration and concrete actions to reduce pollution and carbon emissions, and carry out the “China Shan-Shui Initiative”, then, high-quality and healthy life will be integrated into our lives.

Author Contributions

Yun, W. J. designed the framework of the paper. Ma, R. M. wrote the paper. Fan, M. X. collated the information and documents.

Conflicts of Interest

The authors declare no conflicts of interest.

References

- [1] Lin, P., Sun, D. F. Science on land suitability and development of native agro-specialities [J]. *Journal of China Agricultural University*, 2002, 7(1): 33–39.
- [2] Liang, Y. Secure every line from farm to table [N]. *Economic Daily*, 2022-09-07.
- [3] Chinese society of Nutrition. Dietary Guidelines for Chinese residents [M]. Beijing: People's Medical Publishing House, 2022.
- [4] Liang, L., Bradley, G. R., Xie, B., *et al.* Developing functional agriculture to solve hidden hunger problem [J]. *Science & Technology Review*, 2017, 35(24): 82–89.
- [5] Roslund, M. I., Puhakka, R., Grönroos, M., *et al.* Biodiversity intervention enhances immune regulation and health-associated commensal microbiota among daycare children [J]. *Science Advances*, 2020, 6(42), eaba2578.
- [6] FAO. A framework for land evaluation [Z]. Rome, 1976.
- [7] Jin, L. R., Sun, K. P., He, H. S., *et al.* Research advances in habitat suitability index model [J]. *Chinese Journal of Ecology*, 2008(5): 841–846.
- [8] He, Y. B., Chen, Y. Q., Yang, P., *et al.* An overview and perspective of alien land suitability evaluation study based on GIS technology [J]. *Progress in Geography*, 2009, 28(6): 898–904.
- [9] Wu, Q. M., Wang, L., Zhu, R. P., *et al.* Nesting habitat suitability analysis of red-crowned crane in Zhalong Nature Reserve based on MAXENT modeling [J]. *Acta Ecologica Sinica*, 2016, 36(12): 3758–3764.
- [10] Jin, Z. F., Huang, J. F., Li, B., *et al.* Suitability evaluation of tea trees cultivation based on GIS in Zhejiang Province [J]. *Transactions of the Chinese Society of Agricultural Engineering*, 2011, 27(3): 231–236.
- [11] Wu, J., Wu, K. N., Huang, Q., *et al.* Research progress on the suitability of “local specialty” agricultural products in China [J]. *Chinese Journal of Agricultural Resources and Regional Planning*, 2023-10-24.
- [12] Ga, W., Zhao, Y. H., Hou, Y. J. Leading the high quality development of agriculture with brand—written on the sixth “Chinese brand day” [N]. *Farmers' daily*, 2022-05-10.
- [13] The CPC Central Committee, the State Council. The Central Committee of the Communist Party of China and the State Council on the establishment of territorial space planning system and supervision of the implementation of opinions [Z]. 2019-05.23. https://www.gov.cn/xinwen/2019-05/23/content_5394187.htm.