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Basic Farmland Protection System in China: Changes, Conflicts and Prospects

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Abstract: Farmland protection is important for ensuring national food security and promoting sustainable socioeconomic development. China has a far lower amount of farmland area per capita than the global average. To improve farmland productivity, the Chinese government has implemented a basic farmland protection system (BFPS). A comprehensive and systematic analysis of the evolution mechanism of the BFPS, the failures of the BFPS and the key measures of the modern BFPS reform is lacking in the current literature. Based on a systematic review of the history of China's BFPS, this study first summarizes the evolutionary mechanism of the BFPS, then analyzes the current conflicts faced by the BFPS on this basis, proposes several main breakthrough strategies for improving the BFPS and finally provides key ideas for further strengthening the development of the BFPS in the future. The results of this study show that China's BFPS has gone through three development stages since 1963 and that there are differences in the main factors hindering the improvement in basic farmland productivity in the different stages. Correspondingly, the systems adopted to meet the demands for basic farmland protection are also different. The evolution of the BFPS is similar to a "scale" that constantly seeks balance between "system demand" and "system supply". In the present stage, the main conflicts faced by China's BFPS are between basic farmland quality and requirements for supplementary delimitation and production patterns; between basic farmland quantity, urban development and food security; and between basic farmland-use regulation and modern agriculture and the market economy. The Chinese government should further optimize the BFPS through improving the delimitation system, establishing a classified protection system and strengthening the basic farmland protection compensation system. To accelerate the establishment of a territorial spatial planning system in the future, the BFPS should also be fully integrated with the concept of an ecological civilization, be applied to resolve the contradiction between development and protection and be used to help improve the land-space-utilization control system, thus creating a unified development guide for national land.

Keywords: farmland protection; basic farmland protection system; system change; system reform; territorial spatial planning; China

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1. Introduction

Farmland provides the most important means of agricultural production and is a basic resource and requirement for human survival. Farmland protection is a societal measure that is implemented when conflicts develop between population growth, resources, the environment and development, especially when nonagricultural occupation of a large amount of agricultural land and the deterioration of the land's ecological environment pose a major threat to the foundation of human survival and sustainable regional socioeconomic

development [1]. As part of the process of sustainable agricultural and rural development, farmland protection is of great significance for ensuring food security, achieving sustainable resource utilization and environmental quality and increasing farmers' economic benefits [2]. Farmland protection systems are an important way to achieve the goal of farmland protection [3]. When users or holders of farmland prioritize economic value in their understanding of farmland resource value, they will shift farmland to land-use types or farmland-use patterns that generate more economic benefits. However, to prevent risks to food security, ecological security or social security that develop through excessive development or extensive farmland use, farmland resources must be readjusted and reallocated with the help of a farmland protection system [4–7]. Due to fluctuations in international food prices, the growth of the world population, the increase in global environmental pressure and worries about food security, countries worldwide are expected to pay more attention to farmland protection systems in the future [8].

The Agricultural Land Reserve in British Columbia, Canada, is one of the earliest cases worldwide of protecting farmland through legislative land-use regulation. The policy ensures local agricultural production and regional food security through enacting space limitations [9]. With the continuous development of society and the economy, developed countries have entered a stage of high-quality industrialization and urbanization, and the main goal of their farmland protection systems has gradually become protection of traditional agricultural landscapes and ecological environments [10]. For example, in Israel, to balance the relationship between urban development and open-space protection, the Central District Plan was formulated to clarify the reasons for protecting farmland from basic principles, list the positive externalities of various types of nonmarket value provided by farmland and design open spaces on the basis of these considerations [11]. To reduce the loss of farmland on the outskirts of urban areas, some European countries control the scale and use of buildings through strengthening supervision of and restrictions on urban planning in agricultural regions [12]. The United States has prohibited the federal government from regulating private or nonfederal land through enacting the Farmland Protection Policy Act to minimize unnecessary and irreversible farmland conversion caused by federal projects [13], and established systems for acquisition and transfer of land development rights to achieve large-scale farmland protection [14]. However, since developing countries are still in a period of rapid industrialization and urbanization, their farmland protection systems still focus on maintaining farmland quantity and quality to ensure food security in the context of rapid population growth [10].

As the largest developing country in the world, China has had to implement an extremely strict farmland protection system due to its large population and relatively small amount of farmland. When the evolutionary path is explored, characteristics and trends of China's farmland protection system can effectively reveal the weaknesses in the existing system and correctly characterize the conceptual definition and policy logic behind farmland protection in the modern era, thus providing a theoretical basis and support for future farmland system reform [15–17]. The existing farmland protection system in China not only helps limit farmland occupation by nonagricultural development and maintain the total dynamic balance of farmland [18–21] but also helps restrict urban expansion [22]. However, due to unclear property rights with regard to farmland protection, there is still a certain gap between the implementation effects and the goals of the farmland protection system in China [23,24]; moreover, the level of regional economic development is negatively correlated with the implementation effect of the farmland protection system [25–27]. In addition, due to the low comparative benefits of farmland, the farmland protection system is not entirely fair to farmers [28]. A valid farmland protection system would fully consider the nonmarket values of farmland ecosystems and would increase the level of social welfare [29]. In contrast, excessive emphasis on farmland protection would result in a farmland protection system that would have only one-sided objectives. This result is concretely manifested in local governments and farmers who pay too much attention to short-term benefits, emphasizing only the amount of farmland and neglecting protection

of farmland quality and the ecological environment [30–33]. In addition, some scholars believe that farmland protection is not an effective or necessary means of ensuring food security in China [34].

Basic farmland in China is defined as farmland that must not be occupied by nonagricultural land use in accordance with the demands of the population, the requirements of socioeconomic development for agricultural products in a certain period and general land-use planning policies [35]. Basic farmland is the core type of farmland, and protecting basic farmland is the main way to achieve overall farmland protection [36]. Maintaining permanent and stable basic farmland plays an important role in holding the "red line" of farmland; ensuring national food security; and promoting comprehensive, coordinated and sustainable socioeconomic development [37]. The basic farmland protection system (BFPS) is a land-management system that is based mainly on land-use control and is an effective farmland protection measure [38]. Some scholars have carried out relevant research on the definition, evolution process, performance and existing problems of China's BFPS [39–43], and this research has played an important role in improving relevant policies and regulations. The selection of a BFPS is closely related to socioeconomic development within a certain period of time [44]. In principle, China's agricultural resource allocation mechanism partially resolves farmland deficiency via appropriately importing nonstaple agricultural products to make full use of the limited domestic farmland resources and ensure absolute staple grain security. However, since COVID-19 ravaged the world in early 2020, many countries began to restrict grain exports, which has brought a certain degree of uncertainty to China's current food security [45]. In the context of fluctuations in the global food market, to effectively ensure food security, China's requirements for basic farmland protection will become more stringent, and research on improving and perfecting the BFPS will also become a focus. However, the existing relevant studies lack a comprehensive and systematic understanding of the conflicts in and reform direction of China's BFPS. Therefore, with the goals of providing strong support for the development of China's territorial spatial planning system, based on systematically chronicling the evolutionary process of China's BFPS, this study first summarizes the evolution mechanism of the BFPS, then offers some contradictions and conflicts that exist in the current BFPS and finally proposes several ways to improve the BFPS on the basis of relevant experience in farmland protection from other countries. The data used in this study are from the published literature, statistical yearbooks and government gazettes. The results of this study can provide a reference for a comprehensive and systematic understanding of the history of China's BFPS and can be used as an example for strengthening and improving the farmland protection systems in China and in other developing countries.

2. Changes in China's Basic Farmland Protection System

2.1. Development Stage of the Basic Farmland Protection System

Based on certain basic farmland protection policies and measures, farmland-use changes and social and economic development situations in China, this study divided the changes in the development of China's BFPS into three stages: exploration of basic farmland protection (1963–1978), delimitation of basic farmland protection zones (1979–2007) and delimitation of permanent basic farmland (since 2008).

2.1.1. Exploration of Basic Farmland Protection (1963–1978)

From the founding of the People's Republic of China in 1949 to 1957, due to the central government attaching great importance to land development, China's farmland area increased for 8 consecutive years, with a growth rate of 14.25% [46]. To further improve farmland productivity, the term "basic farmland" first appeared at the Working Meeting of Water and Soil Conservation for the Lower Reaches of the Yellow River, held in 1963. A resolution was proposed to gradually establish basic farmland with a high capacity to resist drought and flooding and achieve high yields through water and soil conservation [47]. In the nearly 20 years following this proposal, low-yielding fields were transformed mainly

through farmland engineering measures such as building terraces, constructing water conservation projects and improving the soil to construct basic farmland and improve farmland quality [48].

Since the core goal of basic farmland protection is to preserve the productivity of basic farmland [49], and the grain yield per unit area can be used to measure the productivity of farmland [50], this paper indirectly measures the implementation effect of the BFPS through calculating changes in grain production per unit area. From 1963 to 1978, China's grain production per unit area increased from 1408 kg/ha to 2527 kg/ha [51], with an average annual growth rate of 5.30%. In this stage, engineering measures were mainly adopted to construct basic farmland. An increase in farmland productivity was promoted to a certain extent in China through improving farmland quality.

2.1.2. Delimitation of Basic Farmland Protection Zones (1979–2007)

Before the reform and opening up in 1978, China mainly took the road of industrialization and implemented the planned economy system, so farmland area decreased for 12 consecutive years under the government's control, from 1965 to 1977, with an average annual reduction rate of −0.36% [46]. With continuous advancement of urbanization and industrialization and large-scale adjustment of agricultural structure under the market economy system after the reform and opening up, the amount of farmland in China continued to decrease. From 1979 to 1989, farmland area decreased for 10 consecutive years, with an average annual reduction rate of −0.39% [46]. Although the sharp decrease in farmland was initially controlled through strengthening land management, the phenomenon of nonagricultural development occupying high- and stable-yield farmlands and vegetable fields in large- and medium-sized cities continued to increase, and reduction in high-quality farmland area still hindered improvement in farmland productivity. In this context, initial efforts to delimit basic farmland protection zones began gradually, starting in 1988 in Jingzhou city, Hubei Province. In 1992, the Chinese government decided to promote the delimitation of basic farmland protection zones throughout the country and required all parts of the country to establish a BFPS and a soil fertility compensation system (through measuring the amount of fertilizer input from farmers and comparing it with the prescribed standard value; farmers whose input exceeded the standard would be rewarded, while those who failed to meet the input standard would be required to make it up within a time limit or be punished [52]) under the background that output of agricultural production was valued, input for agricultural production was ignored and soil organic matter content was low, so as to ensure sustainable and stable development of agricultural production [53]. This act achieved the historical transition from farmland protection to basic farmland protection. In 1994, the BFPS was established in law at the national level in China [54]. In 1996, management practices for basic farmland protection zones were further standardized and improved. Relevant governmental departments required that the production conditions, yields, protection periods and requirements of farmland should be comprehensively considered in delimiting basic farmland protection zones and that the various production resources and pollution factors input into basic farmland protection zones in agricultural production activities should be strictly controlled [55,56]. In 1998, basic farmland was included in the Land Management Law of the PRC, and the BFPS became a basic system within China's land-management system [57]. In the same year, the definition of basic farmland was adjusted to "farmland that must not be occupied by non-agricultural land uses in accordance with the demands of the population and the requirements of socioeconomic development for agricultural products in a certain period and in accordance with general land use planning policies" [58]. This concept has generally remained the same since then.

After systematic delimitation and continuous adjustment, China had a total of 1.589 billion mu (1 mu = 1/15 ha) of basic farmland by 2004 [59], and the protection rate for basic farmland reached 81.46%. From 1979 to 2007, China's grain production per unit area increased from 2785 kg/ha to 4756 kg/ha [51], with an average annual growth rate of 2.53%.

In this stage, the increase in basic farmland productivity was further promoted in China mainly through maintaining basic farmland area and improving basic farmland quality.

2.1.3. Delimitation of Permanent Basic Farmland (Since 2008)

The Land Management Law issued in 1998, while putting forward the BFPS, also put forward the farmland requisition–compensation balance system; that is, after nonagricultural construction occupies farmland, the occupier should reclaim land equivalent to the quantity and quality of the occupied farmland. Therefore, farmland area was relatively stable in a certain period after 1996, but the phenomenon of occupying high-quality farmland but supplementing low-quality farmland occurred from time to time. In 2008, the concept of permanent basic farmland, that is, that basic farmland could not be changed to other uses under any circumstances and could not be used for other purposes in any way, was put forward in the Third Plenary Session of the 17th Central Committee of the Communist Party of China. This concept clearly reflects the firm attitude of the Chinese government regarding strictly protecting farmland, especially basic farmland. In 2009, the initial phase of the delimitation of permanent basic farmland officially began in China. All parts of the country were required to increase their investment in basic farmland development and to improve the quality of basic farmland [60]. On the basis of these efforts, in 2014, the Chinese government further required that existing high-quality farmland that could be easily occupied around cities and towns and along traffic truck lines should be prioritized for delimitation as permanent basic farmland to maximally ensure the national comprehensive grain production capacity [61]. In 2017, the delimitation of permanent basic farmland was generally completed, and the five tasks of obtaining plots, clarifying responsibilities, setting up signs, creating lists and importing to a database were achieved. To fully implement special protection of permanent basic farmland, the Chinese government decided in 2018 to establish and improve long-term mechanisms for delimitation, development, management, supplementation and protection of permanent basic farmland; continue to strengthen the development of quality of permanent basic farmland; and gradually develop all basic farmland into high-standard farmland [62]. In recent years, as China's economy has gradually shifted to the stage of high-quality development, higher requirements have been proposed to maintain the protective boundaries of permanent basic farmland. Therefore, since 2019, China has continued to consolidate the areas delimited as permanent basic farmland to effectively solve problems such as incorrect delimitation and illegal occupation and to provide organized, standardized guidance for agricultural production activities under the premise of ensuring basic self-sufficiency in cereal production, absolute security in staple grains, basic stability on the grain planting scale and nondisturbance of farmland plough layers [63].

To implement special protection for high-quality farmland, the permanent basic farmland delimited for each provincial-level administrative region should generally account for more than 80% of the farmland in the administrative region, and no unit or individual may occupy this farmland or change its use without authorization [64]. From 2008 to 2021, China's grain production per unit area increased from 4969 kg/ha to 5805 kg/ha [51], with an average annual growth rate of only 1.20%. During this stage, sustainable development of basic farmland productivity was realized in China mainly through implementing permanent protection of basic farmland and strengthening farmland-quality construction.

2.2. Evolution Mechanism of the Basic Farmland Protection System

According to new Western-system economics [65], system change is a process in which one system with higher benefits replaces another system and its inducement lies in the subject's expectations to obtain the maximum potential profits. The existing system structure is in a state of balance when any change in the existing system arrangements cannot generate additional income for any individual or group in the economy. However, this balance is usually not permanent, as some external events can generate pressure on system innovation. System choice and system change can be analyzed with the classical

theoretical framework of "demand-supply": the pressure of system innovation, namely, the increase in "system demand", is the necessary condition for system change. In this context, the country increases the "system supply" according to its conditions. When the "system supply" adapts to the "system demand", the state of the system balance is presented.

Based on the above theoretical basis and combined with the development stages and characteristics of China's BFPS, this paper hopes to further analyze the evolution mechanism of China's BFPS. The specific objective of basic farmland protection has not been directly proposed in the relevant policies of China, but it can be inferred, through the concept of basic farmland, that the implementation of the BFPS was primarily for preserving the productivity of basic farmland. In the process of social and economic development, the leading factors affecting the productivity of basic farmland are constantly changing. Accordingly, the system arrangements used to break the barriers to productivity of basic farmland are also constantly updated to effectively preserve that productivity. In effect, this process is similar to a "scale" that constantly seeks balance in the process of swinging. As shown in Figure 1, the weights on the left side of the scale represent "system demand": that is, the demand for system change when potential productivity cannot be obtained under the existing BFPS. In the 1960s and 1970s, farmland quality was the main factor hindering the improvement of farmland productivity, so improving farmland quality became the primary demand for BFPS construction, this demand caused the scale to tilt to the left and the system presented an unbalanced state. The weights on the right side of the scale represent "system supply": that is, the innovation of the BFPS by the Chinese government. China actively explores the BFPS to adjust the scale to a state of balance. In this stage, engineering measures are adopted to improve the quality of low-yielding fields, to construct basic farmland and to improve productivity. When the adjusted BFPS can meet the current production needs of basic farmland, the scale will achieve a state of balance. Furthermore, the demand and supply of the BFPS will become the resistance and power of the scale, respectively. With the continuous development of society and the economy, the quantity and use regulation of farmland have also become the leading factors affecting the productivity of basic farmland. Therefore, China has met the corresponding protection needs through system arrangements such as regional assignment and permanent protection, and it has achieved continuous improvement in the productivity of basic farmland. In summary, the "scale" model of the evolution of the BFPS mainly reflects the interaction between the production demand of basic farmland and the innovation of the BFPS.

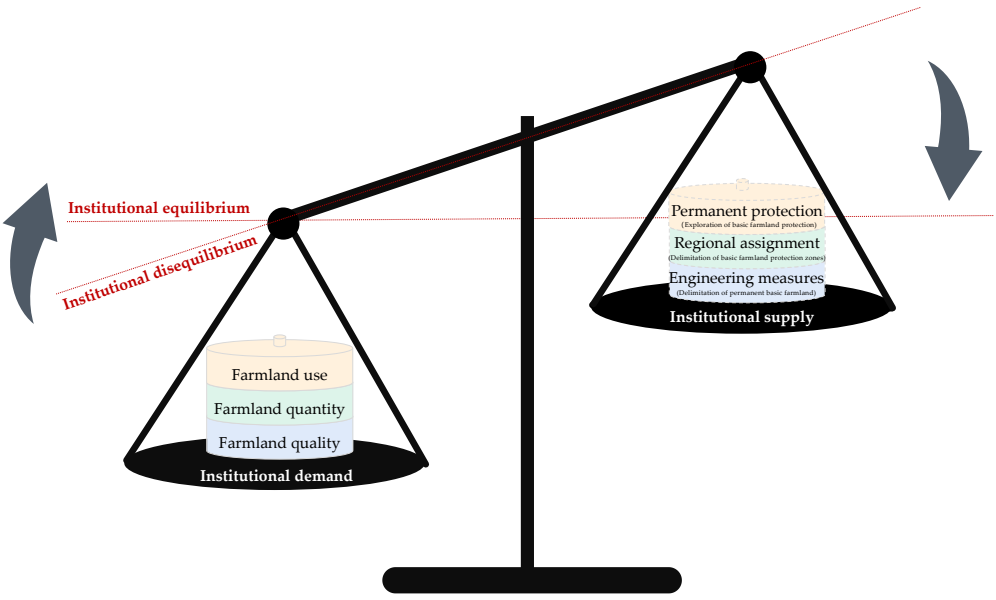

Figure 1. A "scale" model of the evolution of the basic farmland protection system.

Since the demand for basic farmland protection is constantly changing, it is still difficult for the "scale" to be in a long-term balance state after the system has been improved in several stages. Therefore, if we want to further improve the productivity of basic farmland in the future, we need to continue to analyze the new demands of basic farmland protection in the new era from the three aspects of quality, quantity and use, and to continue to improve the BFPS. Meanwhile, in this process, it is also necessary to clarify that the unbalanced state of "scale" can be divided into two cases for discussion: one is that the supply of the BFPS is insufficient and temporarily cannot meet the existing strong demand for basic farmland protection, leading to the "scale" being tilted to the demand side, and that the construction of the BFPS should be further strengthened in the future; the other is that the demand for basic farmland protection has weakened over time, leading to an oversupply of the existing BFPS and the "scale" tilted to the supply side, and that the BFPS should be adjusted reasonably in the future.

3. Current Conflicts in Basic Farmland Protection

Through studying the evolution mechanism of the BFPS, it can be found that the change in production demand is the main driving force for the evolution of the BFPS. Therefore, this paper further analyzes the conflicts between the basic farmland protection demand and the current BFPS from the aspects of quality, quantity and use to clarify the optimization direction of the BFPS.

3.1. Quality Protection of Basic Farmland

3.1.1. Farmland Quality Cannot Meet the Quality Demand for Supplementary Delimitation of Basic Farmland

In 2017, China's actual farmland area was 2.023 billion mu, and the actual permanent basic farmland area was 1.551 billion mu [66]. The proportion of basic farmland in the total farmland was 76.65%, which was lower than the 80% required by the existing BFPS. However, in recent years, China's farmland resources have continued to decrease, with a reduction rate of 0.37% from 2009 to 2017 (Figure 2). While the farmland area declined, the farmland quality in China was also not promising. From 2013 to 2016, the average grade of farmland quality in China remained between 9.96 and 9.97, which is a moderate-quality grade. During this period, the proportion of moderate-grade farmland area decreased by 0.21%, both superior- and high-grade farmland increased by 0.04% and the proportion of low-grade farmland area increased by 0.13% (Figure 3).

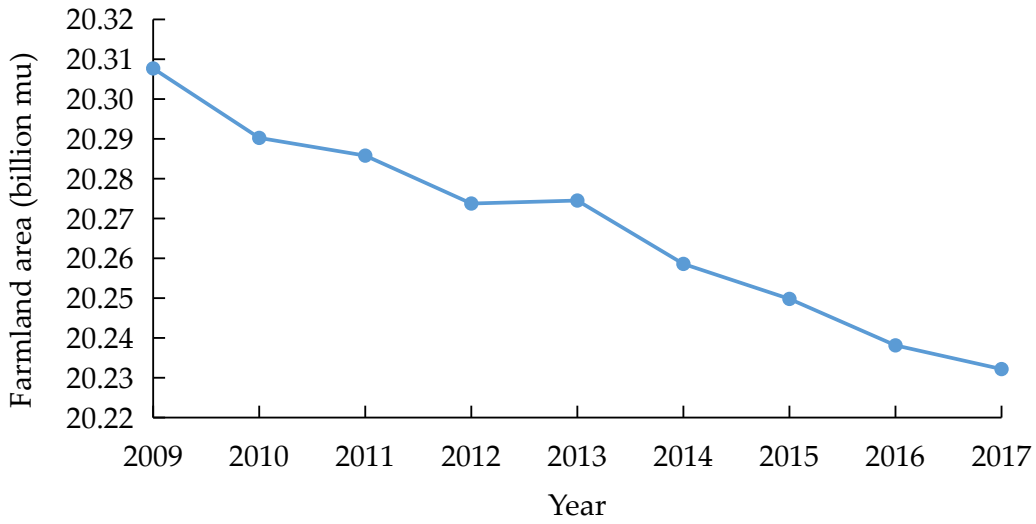

Figure 2. Changes in China's farmland area from 2009 to 2017 [51].

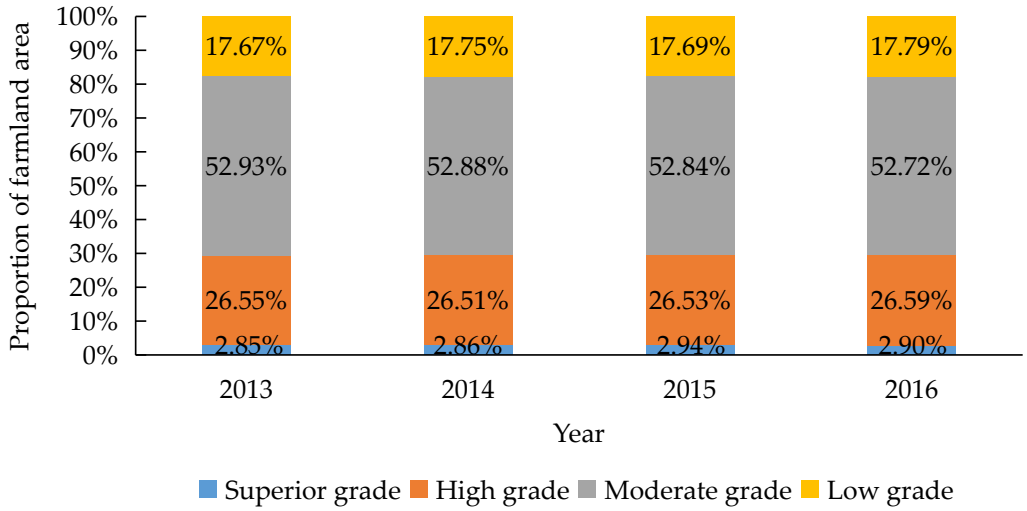

Figure 3. Changes in China's farmland quality from 2013 to 2016 [67]. Notes: The Ministry of Natural Resources classified farmland in China into 15 grades based on comprehensive consideration of a variety of indicators, such as climate, terrain, soil, farmland infrastructure and land use. The quality of first-grade farmland is the best, and the quality of fifteenth-grade farmland is the worst. The farmlands of grades 1 to 4, 5 to 8, 9 to 12 and 13 to 15 are defined as the farmlands of superior grade, high grade, moderate grade and low grade, respectively.

At present, the results of permanent basic farmland delimitation have been comprehensively verified throughout China. Problems such as incorrect delimitation and illegal occupation will further lead to a decline in the quantity of permanent basic farmland, so it is necessary to propose a corresponding supplementary plan to address these problems. However, in the context of decreasing farmland quantity and quality, farmland, especially high-quality farmland that can be added to the total permanent basic farmland area, is becoming increasingly less common. It is difficult to meet the quality demand for supplementary delimitation of basic farmland, that is, no degradation in basic farmland quality, and opportunities for spatial optimization and adjustment of basic farmland are limited. Therefore, it will become increasingly difficult for China to implement its permanent basic farmland protection tasks in the future.

3.1.2. The Production Pattern Is Inconsistent with the Distribution of Basic Farmland Quality

China's grain production pattern has gradually evolved from "south-to-north grain transport" to "north-to-south grain transport". The proportion of grain production in South China dropped from 60.50 to 40.57% from 1981 to 2021, while that in North China rose from 39.50 to 59.43%. In 2005, the grain production in North China exceeded that in South China, and the gap has been increasing ever since (Figure 4). The direction of the grain flow between North China and South China changed mainly due to the comparative advantages of grain production in each region, which obviously differed with the different economic developments of the two regions [68]. However, farmland quality is the natural basis of farmland productivity in the long run [69], and the sustainability of the existing agricultural production mode in the future will also depend on the quantity ratio relationship between water and land resources, which are the core resources for agricultural production [70]. Calculating the ratio of agricultural water resources to farmland area for both South and North China from 2009 to 2017 [71] revealed that the ratio of agricultural water resources to farmland area in South China was always higher than that in North China (Figure 5). North China has nearly 60% of China's farmland (Figure 6) and produces nearly 60% of China's grain, but it has less than 20% of China's water resources; therefore, water and farmland resources in North China are unevenly distributed. Although the South-to-North Water Diversion Project implemented in China has alleviated the serious water resource

shortage in North China to a certain extent, the "south-to-north water diversion" of water resources and the "north-to-south water diversion" of virtual water in the grain trade will greatly increase the cost of grain production [72].

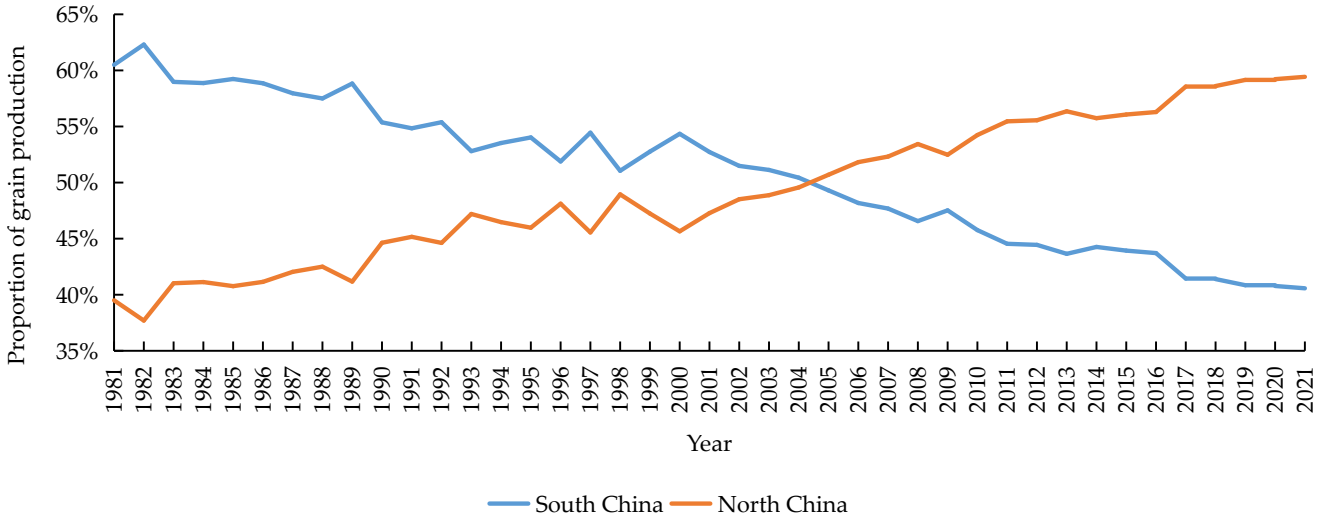

Figure 4. Changes in the proportions of grain production in South and North China from 1981 to 2021 [51].

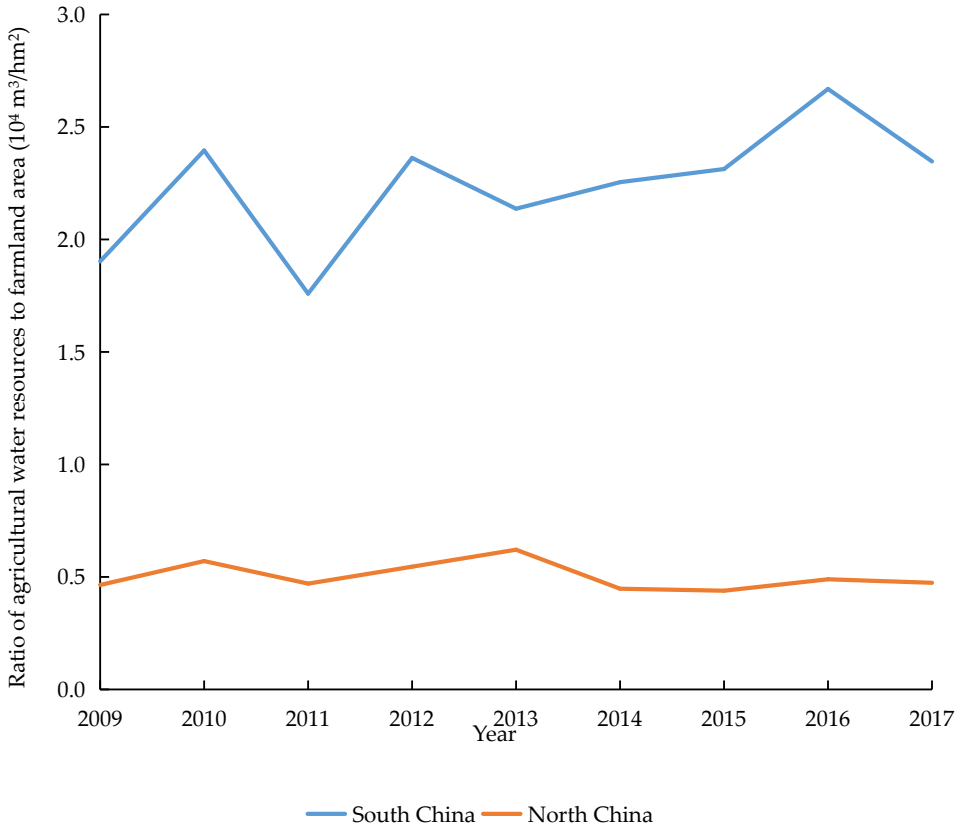

Figure 5. Changes in the ratios of agricultural water resources to farmland area in South and North China from 2009 to 2017. Notes: The total water resources, total water consumption, agricultural water consumption and farmland area data are used to calculate the ratios of agricultural water resources to farmland area [51].

Figure 6. Farmland distribution in South and North China in 2020. Note: This figure was designed under the standard map numbered GS(2020)4619 on the website of the standard map service of the Ministry of Natural Resources [73], and the base map has not been modified. The farmland data are from the website of the Resource and Environment Science and Data Center of the Chinese Academy of Sciences [74].

3.2. Quantity Protection of Basic Farmland

3.2.1. Urban Development Threatens the Quantity of Basic Farmland

Land resources are the material basis on which a country and its residents survive. To achieve national land development and protection that is more high-quality, efficient, fair and sustainable, a territorial spatial planning system is being established in China to make spatial and temporal arrangements for the development and protection of a specific region, which will be the primary reference for various development, protection and construction activities [75]. In addition, three control lines, namely, the red line for ecological protection and the permanent basic farmland and urban growth boundaries, which cannot overlap with each other, overall shall be delimited and implemented in territorial spatial planning. These three lines will be impassable for adjusting economic structure, planning industrial development and promoting urbanization [76]. The Chinese government attaches great importance to food security and ecological civilization and stipulates that urban growth boundaries should be removed from the red lines for ecological protection and permanent basic farmland as much as possible. With acceleration of China's urbanization process and continuous expansion of urban space, the red line for ecological protection and the permanent basic farmland boundaries delimited around cities can become solid boundaries, restricting urban sprawl and forcing land use in urban space to be economical and intensive [77]. Therefore, based on national conditions, the Chinese government has stipulated that the order of priority for the implementation of the three control lines in territorial spatial planning should be permanent basic farmland, the red line for ecological protection and urban growth boundaries.

However, from the perspective of practical implementation, the core concept of planning is still in "development" for both governments at all levels and professional planning teams. For example, China's general land-use plan, formulated in 2008, planned to control the total construction-land area to within 3.37×10^7 ha and 3.72×10^7 ha by 2010 and 2020, respectively, but China's construction-land area was only 3.19×10^7 ha at the end of

2005 [78]. In 2016, China revised this plan to further increase the total scale of construction land in 2020 to 4.07 × 10^7 ha [79]. Expansion of construction land is still the top priority for planning, which makes permanent basic farmland an obstacle to local development; therefore, farmland protection has become a weak, passive action. According to the trends of reduction in farmland area in China from 2010 to 2017, construction occupation was the main factor causing the loss of farmland resources, and the proportion of reduced farmland area occupied by construction increased and had risen to more than 80% by 2017. Moreover, the scale of ecological restoration of farmland showed an increasing trend, and its proportion of reduced farmland area increased from 2.03% in 2010 to 5.64% in 2017 (Figure 7). Therefore, in practice, the order of priority for the implementation of the three control lines is the urban growth boundaries, the red line for ecological protection and permanent basic farmland, and the quantity of basic farmland under significant threat in the context of urban development.

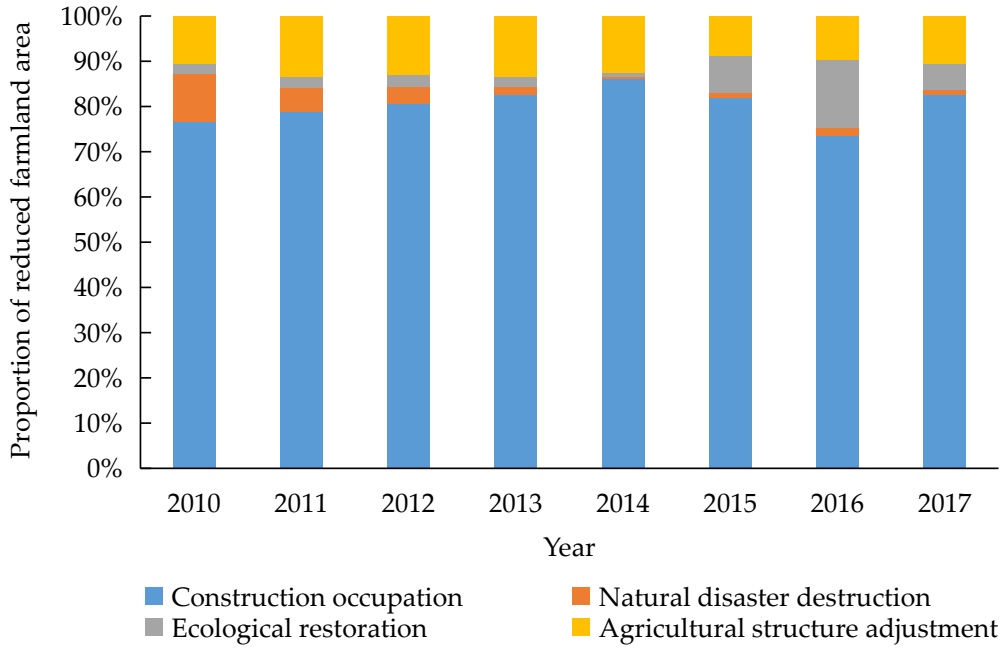

Figure 7. Changes in China's farmland reduction from 2010 to 2017 [66].

3.2.2. The Requirement of Basic Farmland Quantity Does Not Match the Demand for Food Security

From the perspective of the per capita consumption of major foods from 2013 to 2021, Chinese residents' demand for grain is declining, and the demand for agricultural products such as meat, eggs, milk, melons and other fruits shows an increasing trend (Table 1). From the demand side, the consumption demand of animal food is on the rise, and the dietary structure of Chinese residents is developing in a balanced and healthy direction from traditional plant-based food. In 1996, the Second World Food Summit adopted the Rome Declaration and the Plan of Action, with the following expression on world food security: "Food security is achieved only when all people at all times have material and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life" [80]. China's basic farmland is planted mainly with grain crops. However, grain production should not only include grain directly for human consumption but also grain for animal fodder, which indirectly meets people's food-consumption needs [81]. Although changes in human dietary structures will cause a decline in grain directly for human consumption, these changes will increase the demand for grain used as fodder. Therefore, to meet the fodder consumption demand for animals, our understanding of food security ensured through basic farmland should also gradually expand from "grain ration security" to "grain security" in the future.

Table 1. Per capita consumption of major foods by Chinese residents from 2013 to 2021 [51]. Unit: kg.

Year	Grains	Edible Oils and Fats	Vegetables and Edible Mushrooms	Meat and Meat Products	Poultry	Seafood	Eggs	Milk and Dairy Products	Dried and Fresh Melons and Fruit	Sugar
2013	148.7	10.6	97.5	25.6	7.2	10.4	8.2	11.7	40.7	1.2
2014	141	10.4	96.9	25.6	8	10.8	8.6	12.6	42.2	1.3
2015	134.5	10.6	97.8	26.2	8.4	11.2	9.5	12.1	44.5	1.3
2016	132.8	10.6	100.1	26.1	9.1	11.4	9.7	12	48.3	1.3
2017	130.1	10.4	99.2	26.7	8.9	11.5	10	12.1	50.1	1.3
2018	127.2	9.6	96.1	29.5	9	11.4	9.7	12.2	52.1	1.3
2019	130.1	9.5	98.6	26.9	10.8	13.6	10.7	12.5	56.4	1.3
2020	141.2	10.4	103.7	24.8	12.7	13.9	12.8	13.0	56.3	1.3
2021	144.6	10.8	109.8	32.9	12.3	14.2	13.2	14.4	61.0	1.3

However, compared with the grain demand of residents, grain production in China is excessive. In 2021, China's per capita grain production was 483 kg, the per capita grain directly for human consumption was 144.6 kg [51] and the grain directly for human consumption accounted for only 29.9% of grain production. The percentage of the total grain consumption that directly accounts for human consumption has been declining since 1961 and is expected to eventually stabilize at approximately 45% [82]. All of these statistics indicate that China's grain production is currently much higher than its consumption. From the supply side, with continuous improvement in the level of agricultural modernization, the grain production per unit area has continued to increase. Due to a continuous increase in the scale of grain imports and exports, China's grain supply is extremely sufficient to meet its demand. Therefore, the existing production scale for basic farmland may be higher than the market demand for agricultural products, which will put a certain pressure on land management in all parts of China. The scale and planting structure of basic farmland in China should be adjusted and optimized on the basis of transformations in the types and amount of food needed by residents in the future.

3.3. Use Regulation of Basic Farmland

3.3.1. The Use Conditions of Basic Farmland Cannot Meet the Needs of Modern Agriculture

Operational mechanization is the most fundamental and significant feature of modern agriculture. It replaces farm animals with mechanical equipment, thereby disrupting natural, small-scale farm production conditions and completing the transition from traditional agriculture to modern agriculture [83]. In traditional agriculture, the tillage model performed by humans and livestock is very labor-intensive, so farmland plot area is limited to a certain extent. Moreover, the household contract responsibility system implemented in China requires that land be evenly distributed according to the population, and that land of various qualities should be evenly collocated. However, there are many people and comparatively little land in China. Therefore, this system not only keeps the scale of farms small but also has led to a very scattered distribution of farmland plots. At the end of 2015, the average farmland area per household in Eastern China's rural areas was 0.27 ha, the average number of farmland plots per household was 2.38, and the average size of each farmland plot was only 0.11 ha [84]. However, a plot area greater than 0.36 ha is considered the appropriate size for small- and medium-sized mechanized farming systems in the eastern region [85]. Therefore, even in Eastern China, where grain productivity is high and the terrain is relatively flat, the average scale of existing farmland does not meet the requirements for large-scale mechanization of agricultural production; this situation is especially true for basic farmland. Although in principle, any additional delimited basic farmland is required to be contiguous with existing basic farmland, this practice is

limited by the requirements for the protection rate of basic farmland and the quality of supplementary farmland. Therefore, any farmland that can be protected must generally be protected as basic farmland, and it is difficult to form large areas of basic farmland.

Protected agriculture is an important form of modern agriculture and an important channel for increasing farmer income [86]. However, since greenhouses are often accompanied by long-term mulching cultivation, highly intensive management and water and heat imbalances within the designated facilities, quality degradation and monocropping obstacles such as secondary salinization, acidification, nutrient imbalances, microbial flora destruction and aggravation of soil-borne diseases generally occur in their soils [87]. Therefore, in 2010, the Chinese government clearly required that agricultural-facility land be strictly prohibited from occupying basic farmland [88]. However, with continuous development of modern agriculture supported with industrial equipment, agricultural facilities will surely become the main trend of contemporary agricultural development [89], and restrictions on basic farmland use will thus hinder development of modern agriculture. Therefore, the policy on facility agricultural land in China was further improved in 2014. This policy made it clear that supporting facilities for large-scale grain production could be constructed on basic farmland in plain areas only if it was very difficult to find a site on other land types. Basic farmland should be avoided unless difficulty has been demonstrated; furthermore, basic farmland must be compensated for with other land of equal quantity and quality [90]. Considering that facility construction is conducive to improving agricultural productivity, the Chinese government has further allowed planting facilities that will not destroy the plough layer of farmland to use basic farmland since 2019, and no supplementary delimitation has been required [91].

3.3.2. Restrictions on Basic Farmland Conversion Do Not Conform to Market Mechanisms

Since agricultural production activities not only face the effects of natural disasters but also bear the income risks caused by imbalances of supply and demand and by dramatic price fluctuations on the market, the government must implement necessary special protection measures for agriculture [92]. Among them, protection of basic farmland is an important measure to stabilize agricultural production and ensure food security. As a result, a use-control system for basic farmland has been implemented in China, and it has strictly restricted activities that damage basic farmland in basic farmland protection zones [93]. However, China's grain production is already in a state of surplus at present, and China imports a large amount of agricultural products every year to balance its international trade. The volume of grain imports in China reached 1.43×10^{11} kg in 2020 [94]. Overproduction of agricultural products will not only hurt farmers via lowering prices but will also increase the pressure on national political purchasing and inventory [95].

In 2020, the Chinese government experimentally decentralized the approval authority for converting permanent basic farmland to construction land from the State Council to certain provincial-level administrative regions [96] and proposed promotion of market-oriented land resource allocation [97]. Do the decentralization of governmental rights and the allocation of farmland resources by the market mean that control over use of basic farmland will be relaxed in China? Despite the market economy system, the "storing grain in the land" strategy in China still requires certain basic farmland reserves. In this case, how can farmers' interests be protected?

4. Improvements in China's Basic Farmland Protection System

4.1. Improving the Basic Farmland Delimitation System

Comprehensive delimitation of permanent basic farmland is an important way to ensure national food security and improve overall grain production capacity in China. Water security is the basis of food security [98], so the water–land balance is a basic issue to be considered in delimitation of basic farmland. Humans usually adopt different land-use patterns, farming systems and water resource allocation projects to adapt to different quantity ratio relationships between water and land resources [99]. Therefore, the

degree to which light, temperature, water, soil and other resources are available should be considered first in delimitation of basic farmland. In particular, a suitability evaluation for basic farmland development in North China should be performed to determine a reasonable protection scale for basic farmland in the region [100]. In addition, since the water-resource-supporting capacity for agricultural development in North China is relatively weak, its planting system should be improved with regard to water conservation through appropriately controlling and reducing the wheat planting area and expanding the planting area of low water-consumption crops to achieve large-scale, cost-effective management and stabilize food production. South China's planting system should be improved with regard to land conservation through appropriately expanding the wheat and soybean planting areas and promoting brand-based management to generate additional value; these measures would help this region become a key area for grain production development [101,102].

In 2017, there were 3.792 billion mu of forestland and 3.290 billion mu of grassland in China, which were 1.9 and 1.6 times the area of farmland, respectively [51]. With continuous upgrading of residents' food-consumption structure, agricultural production must also change, from blindly pursuing grain production as in the past to comprehensive food production in the future. It is necessary to obtain grain from farmland as well as food from forestlands, grasslands and water areas. Therefore, the balance of supply and demand should be considered in the process of delimiting basic farmland. The quantity and layout of basic farmland should be adjusted appropriately based on market demand. Basic farmland with low productivity should be converted into grasslands, aquaculture ponds and other types of agricultural land, and the proportions of animal husbandry and aquaculture in agriculture should be increased [103].

Protection and development of basic farmland can significantly improve the service capacity of farmland ecosystems, including not only the grain production capacity of farmland, namely, the service supply capacity, but also the regulation service capacity of farmland, such as regulating regional microclimate, as well as the cultural service capacity of providing entertainment, aesthetic enjoyment and spiritual benefits for the surrounding residents [104]. Therefore, a balance of functions should be considered in the process of basic farmland delimitation. Since basic farmland cannot be occupied casually, farmland that surrounds urban areas and improves their ecological environment should be delimited into basic farmland protection zones; this strategy would take full advantage of the regulation and cultural service functions of farmland, achieve harmonious coexistence between contrasting pastoral and urban landscapes, and result in a "garden city" system [105].

Basic farmland delimitation should also be adapted to the production and management models of modern agriculture. For example, due to serious fragmentation of basic farmland in urbanized areas, development of factory agriculture should be prioritized to improve land productivity and meet the needs of urban residents for efficiently produced, standardized agricultural products. The basic farmland in plain areas is relatively flat, and its conditions are better for large-scale agricultural production than those in other areas. Therefore, construction of production bases for agricultural products should be prioritized to achieve centralized production for important agricultural products. In mountainous and hilly areas, there are limitations on agriculture related to terrain, light and other conditions. Therefore, in these areas, it is necessary to prioritize development of ecological agriculture, utilize modern agricultural technology to rationally develop agricultural resources and take full advantage of the comprehensive functions of agricultural ecosystems [106].

In the Agricultural Land Reserve program in Canada, protected land includes not only agricultural land that has not been developed or has been designated to generate agricultural tax revenue through its high potential productivity but also low-quality agricultural land that could be used in combination with high-quality agricultural land or as an essential part of the successful operations of agricultural ventures [107]. China should learn from this Canadian strategy to progress away from the simple agricultural land-protection

mode, which focuses mainly on protecting natural land resources [108]. Basic farmland is delimited not only to protect a sufficient quantity and quality of farmland for food security but also to comprehensively consider the issues related to basic farmland, such as development of the agricultural industry, farmers' livelihoods and urban expansion. Therefore, a perfected basic farmland delimitation system would comprehensively consider natural, social, economic, environmental and other factors and use a variety of means, such as laws, land-use planning and economic regulations, to achieve its goals [109].

4.2. Establishing a Classified Protection System for Basic Farmland

With continuous improvement in the food-consumption structure of Chinese citizens and in the context of structural reform of the agricultural supply side, the changing trends of dietary structures should be analyzed fully in the future. Moreover, development of agricultural modernization and market transactions for agricultural products should be comprehensively considered in protection of basic farmland to reasonably adjust the regional basic farmland protection area and appropriately reduce the requirements for the basic farmland protection rate. Through appropriately reducing the grain-planting area, the market competitiveness of agricultural products can be enhanced and the comparative economic benefit of agriculture can be improved. At the same time, delimiting the main functional regions for grain production will limit nongrain production on basic farmland to a certain extent [110]. Delimited permanent basic farmland is the security baseline that ensures China's basic self-sufficiency in grain production, and it is the agricultural space with the highest level of protection. Its utilization cannot be changed under any circumstances, and it cannot be used for other purposes in any form.

In the context of food security, it is also necessary to gradually develop the concept of agricultural land protection for whole regions and general land-use types. Policies and regulations for the overall protection of agricultural land should be established and improved. Other agricultural land resources that are important to regional food security should be strictly protected. In addition, the production functions of agricultural and ecological spaces that are not basic farmland should be fully exploited. At the same time, delimited general farmland should be protected to a higher degree to ensure a nonstaple food supply for residents. In addition, combining land use with land conservation as a strategy for "storing grain in the land" should be actively explored as a land-protection mechanism to meet the long-term demand for high-quality agricultural products from agricultural land in the future. Agricultural lands under flexible protection would be delimited in accordance with relevant requirements and include mainly arable land, held as a reserve resource, and fallow farmland. These areas would undergo planned fallowing to improve the quality of the agricultural land on the premise of ensuring food security.

To maintain long-term stability and sustainable productivity of basic farmland, it is necessary to consider both the natural quality of the farmland and its suitability for the current socioeconomic conditions when determining the class of basic farmland [111]. The land evaluation and site assessment (LESA) system established by the Soil Conservation Service of the United States consists of two parts: land evaluation (LE) and site assessment (SA). LE reflects the natural conditions of the farmland, and its evaluation factors include three parts: land-capacity classification, important farmland identification and soil productivity. SA reflects factors other than soils that contribute to the suitability of an area for retention in agricultural use, which usually include the distribution, location, compatibility, timing, etc., related to land-use issues [112]. China's classified protection system for basic farmland could be improved through adoption of aspects of the LESA system. In addition to the natural quality of farmland, site conditions such as socioeconomic development pressure, location advantages and natural landscape features that affect the permanent stability of farmland should be considered [37,113].

4.3. Strengthening the Basic Farmland Protection Compensation System

Use of basic farmland is strictly controlled in China, which limits the development rights of farmers responsible for basic farmland. In the absence of an effective compensation system, opportunities and benefits for farmers who contract or manage these farmlands will be lost, and rent-seeking behaviors and improper motivations may even be stimulated; these consequences will eventually make land use less efficient [114]. In Western developed countries, purchasing of development rights programs has been implemented to keep land in use as agricultural land or open space while providing economic compensation, which can be used to pay off debt, to reinvest in farming or for other purposes, to farmers [115]. In China, there have also been many attempts to apply market transaction mechanisms and provide compensation for farmland development rights, such as land-use quota trading in Zhejiang Province [116], linking an increase in urban construction land with a decrease in rural construction land [117]; land-ticket trading in Chongqing City [118]; and farmland protection funds in Chengdu City [119]. However, the current systems still have some problems, such as the incomplete establishment of the types of farmland development rights, unclear property ownership rights and the imperfect delegation of powers and functions [120].

Therefore, China should fully consider the innovative basic farmland protection compensation systems that have been developed in some regions [121] and build a complete protection compensation system for basic farmland at the national level. First, the establishment of basic farmland protection funds should be considered, and the external benefits of basic farmland should be incorporated into the cost accounting system for basic farmland conversion [122]. Second, relevant clauses related to basic farmland protection compensation should be added to the Land Management Law and the Regulations on the Protection of Basic Farmland. Moreover, a complete policy system for basic farmland protection compensation that describes compensation purposes, compensation fund investments, compensation objects, compensation standards, compensation fund uses, compensation supervision mechanisms and related legal responsibilities should be established [123]. In addition, a series of supporting guarantee measures should be actively developed to increase the economic benefits of farmland production, establish rural social security systems and organically combine compensation mechanisms with territorial spatial planning [124].

5. Discussion and Conclusions

Food is the greatest necessity for all people, and agricultural fields are the principal source of food. Farmland is the lifeblood of a country because it ensures national food security, social stability and economic development. China is a developing country with many people and relatively little land, and the conflicts between people and land in China are extremely severe. To implement the most stringent farmland protection system in the world, China established the BFPS, which protects basic farmland through granting it a nearly sacred and inviolable status. An incomplete BFPS is not conducive to effective protection of high-quality farmland and will lead to a decline in farmland productivity and ultimately endanger national food security and ecological security [125,126]. Since the concept of basic farmland was proposed in 1963, China has been continuously strengthening and improving the BFPS to improve the quality of basic farmland and maintain its productivity. The BFPS in China has gone through three stages: the exploration of basic farmland protection, which was mainly aimed at improving farmland quality (1963–1978); the delimitation of permanent basic farmland, which was mainly aimed at maintaining farmland quantity (1979–2007); and the delimitation of permanent basic farmland, which is mainly aimed at restricting farmland use (since 2008). The primary demand for BFPS construction has changed from improving farmland quality to maintaining farmland quantity to restricting farmland use; the BFPS has met the corresponding demands mainly in terms of engineering measures, regional assignment and permanent protection. The above evolution process is similar to a "scale" that constantly seeks balance between "system demand" and "system supply".

The key task of the BFPS is to preserve the productivity of basic farmland. With population growth and socioeconomic development, the existing BFPS in China is facing unprecedented difficulties. The difficulties in quality are that farmland quality cannot meet the quality demand for supplementary delimitation of basic farmland and that the production pattern is inconsistent with the distribution of basic farmland quality. The difficulties in quantity are that urban development threatens the quantity of basic farmland and the basic farmland quantity requirement does not match the demand for food security. The difficulties in use regulation are that the use conditions of basic farmland cannot meet the needs of modern agriculture and that the restrictions on basic farmland conversion do not conform to market mechanisms. Improving the BFPS would help to ensure national staple grain and cereal security, meet farmers' livelihood and employment needs, protect the regional ecological environment and agricultural landscapes and restrict disorganized expansion of urban space. Improving the basic farmland delimitation system and comprehensively considering the water and land balance, supply and demand balance, functional balance and modern agricultural adaptation of the spatial layout of basic farmland would help to ensure national food security, improve regional ecological services and promote agricultural modernization. Establishing a classified protection system for basic farmland, reducing the basic farmland protection rate, preventing nongrain production on basic farmland, exploiting the production functions of other agricultural and ecological spaces and promoting farmland restoration would help to maintain the long-term stability and sustainable production capacity of basic farmland. Strengthening the basic farmland protection compensation system; setting up a basic farmland protection fund and improving its relevant calculation methods; and implementing laws, regulations and safeguarding measures would help to guarantee farmer rights and benefits and improve the efficiency of basic farmland utilization.

Currently, China relies on compilation of territorial spatial planning to delimit permanent basic farmland and requires the full implementation of its extremely stringent farmland protection system. The BFPS should also be organically integrated with the territorial spatial planning system in the future to jointly develop a spatial blueprint for national sustainable development. The BFPS in China should be further explored and considered in terms of its basic concept, objectives and content and management systems. First, the ultimate goal of territorial spatial planning should be to correctly handle the relationship between development and protection in the process of national socioeconomic development. Therefore, the concept of ecological civilization should be implemented thoroughly, and the original engineering perspective of servicing mainly development and construction should be changed to emphasize organic integration of production, living and ecological spaces. Especially in the process of coordinating ecological development and permanent basic farmland protection, in addition to coordinating the boundary conflicts between the two goals, it is also necessary to take full advantage of the ecological effects and barrier functions of basic farmland to provide sufficient guaranteed ecological space for urban areas and to support sustainable city development. Second, it is necessary to develop a scientific and orderly layout for ecological, agricultural, urban and other functional spaces in territorial spatial planning. Of these factors, agricultural space, especially basic farmland, is the most fundamental to human life. Developing a rational layout involves not only allocation of territories but also ultimately the resolution of the zero-sum game between development and protection through consolidating space definition, type distinction, management convergence and other steps. Finally, the land-space-use utilization control system is an important means for implementation and supervision of territorial spatial planning. This system implements land-use control for all land spaces nationwide through zoning and typing, and its core concept is differentiated management. This system fully considers the various interest hierarchies related to a land space and can represent the objective demands of the whole society and all citizens with regard to improving public welfare. Therefore, the differential protection of basic farmland and even agricultural space not only maintains the diversity of ecosystems and the continuity of farmland landscapes but

also provides a unified support framework for the implementation and operation of the territorial spatial planning system, which has five levels and three categories, as well as other policies.

Moreover, if the cost of implementing the BFPS is much greater than the benefits, and optimization and adjustment of the system still cannot produce a profit, an alternative system may be proposed. However, for China, a country with many people and comparatively little land, the BFPS provides a basic state policy, written into the Land Management Law, that will probably not be abolished in the future for a long time. In future research, reasonable calculation of the costs and benefits of the BFPS and scientific judgment of the system implementation stages and effects will help to optimize or adjust the relevant system in a timely manner.

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References

1. Li, X.W.; Lin, P. The theoretical basis and progress: Utility and protection of the farmer-land in foreign and home. *Prog. Geogr.* **2001**, *20*, 305–312.
2. Cai, Y.L. The mechanisms of cropland conservation in Chinese rural transformation. *Sci. Geogr. Sin.* **2001**, *21*, 1–6.
3. Ren, X.F.; Hou, F.Y. Research on the evolution and existing problems of China's cultivated land protection system. *Theory J.* **2011**, *9*, 31–35.
4. Wu, C.F.; Tan, Y.Z. System defects and cultivated land protection. *Chin. Rural Econ.* **2002**, *7*, 69–73.
5. Cai, Y.L.; Yu, F.Q. Sticking points of fundamental policies for the farmland issue in China. *China Land Sci.* **2004**, *18*, 13–17.
6. Zhang, Y.; Liu, T. 2010. Summary of cultivated land protection system of China. *J. Inn. Mong. Univ.* **2010**, *42*, 33–39.
7. Liu, X.; Zhao, C.; Song, W. Review of the evolution of cultivated land protection policies in the period following China's reform and liberalization. *Land Use Policy* **2017**, *67*, 660–669. [CrossRef]
8. Deininger, K.; Byerlee, D.; Lindsay, J.; Norton, A.; Selod, H.; Stickler, M. *Rising Global Interest in Farmland: Can It Yield Sustainable and Equitable Benefits?* The World Bank: Washington, DC, USA, 2011.
9. Nixon, D.V.; Newman, L. The efficacy and politics of farmland preservation through land use regulation: Changes in southwest British Columbia's Agricultural Land Reserve. *Land Use Policy* **2016**, *59*, 227–240. [CrossRef]
10. Wu, Y.; Shan, L.; Guo, Z.; Peng, Y. Cultivated land protection policies in China facing 2030: Dynamic balance system versus basic farmland zoning. *Habitat Int.* **2017**, *69*, 126–138. [CrossRef]
11. Feitelson, E. Social norms, rationales and policies: Reframing farmland protection in Israel. *J. Rural Stud.* **1999**, *15*, 431–446. [CrossRef]
12. Perrin, C.; Nougarèdes, B.; Sini, L.; Branduini, P.; Salvati, L. Governance changes in peri-urban farmland protection following decentralisation: A comparison between Montpellier (France) and Rome (Italy). *Land Use Policy* **2018**, *70*, 535–546. [CrossRef]
13. Ward, R.M. The US Farmland Protection Policy Act: Another case of benign neglect. *Land Use Policy* **1991**, *8*, 63–68. [CrossRef]
14. Daniels, T.L. Assessing the performance of farmland preservation in America's farmland preservation heartland: A policy review. *Soc. Nat. Resour.* **2020**, *33*, 758–768. [CrossRef]
15. Liu, D.; Gong, Q.W.; Yang, W.J. The evolution of farmland protection policy and optimization path from 1978 to 2018. *Chin. Rural Econ.* **2018**, *12*, 37–51.
16. Niu, S.D.; Fang, B. Cultivated land protection system in China from 1949 to 2019: Historical evolution, realistic origin exploration and path optimization. *China Land Sci.* **2019**, *33*, 1–12.
17. Wang, W.X.; Cao, Y.G.; Su, R.Q.; Qiu, M.; Zhou, W. Evolution characteristics and laws of cultivated land protection policy in China based on policy quantification. *China Land Sci.* **2020**, *34*, 69–78.
18. Zhai, W.X.; Huang, X.J. Analysis on the effect of policies operation of cultivated land protection in China. *China Land Sci.* **2003**, *17*, 8–13.

19. Tan, S.K.; Zhang, H.X. Performance evaluation on the policies of cultivated land protection in China from the perspective of quantity protection. *China Popul. Resour. Environ.* **2010**, *20*, 153–158.
20. Peng, L.; Deng, E.J.; Xie, D.T. An empirical research of the relationship between changes in cultivated land quantity and cultivated land protection policies in China. *J. Southwest Univ.* **2011**, *33*, 103–110.
21. Cheng, L.; Jiang, P.; Chen, W.; Li, M.; Wang, L.; Gong, Y.; Pian, Y.; Xia, N.; Duan, Y.; Huang, Q. Farmland protection policies and rapid urbanization in China: A case study for Changzhou City. *Land Use Policy* **2015**, *48*, 552–566.
22. He, J.; Liu, Y.; Yu, Y.; Tang, W.; Xiang, W.; Liu, D. A counterfactual scenario simulation approach for assessing the impact of farmland preservation policies on urban sprawl and food security in a major grain-producing area of China. *Appl. Geogr.* **2013**, *37*, 127–138. [CrossRef]
23. Ye, Y.M.; Wu, C.F. Research on land property rights system and cultivated land protection in China. *Issues Agric. Econ.* **1997**, *6*, 32–37.
24. Zhang, X.J.; Ou, M.H.; Li, J.G. Analysis on the institution change of cultivated land protection and its performance in China. *J. Soc. Sci.* **2007**, *8*, 13–20.
25. Zhu, H.B. Analysis on the effect and efficiency of policies operation to cultivated land protection in China. *Geogr. Geo-Inf. Sci.* **2007**, *23*, 50–53.
26. Zhang, Q.J.; Ou, M.H.; Wang, W.M. Study on cultivated land preservation performance of land use control system and its regional differences in China. *China Land Sci.* **2008**, *22*, 8–13.
27. Kuang, B.; Zuo, J. Regional heterogeneity of policy tools affecting the effects of cultivated land protection: Empirical analysis based on inter-provincial panel data of China. *J. Huazhong Univ. Sci. Technol.* **2019**, *33*, 69–76.
28. Ji, C.P.; Tang, J.L.; Chen, R.Q. An analysis of implication, equity and efficiency of arable-land protection policies. *Sci. Technol. Manag. Land Resour.* **2005**, *22*, 28–32.
29. Yao, L.Y.; Zhao, M.J.; Xu, T. Social welfare analysis of cultivated land protection policy: Non-market value evaluation based on choice experiment. *Issues Agric. Econ.* **2017**, *38*, 32–40.
30. Guo, Z. The farmland protection system of China: Implementation performance evaluation, implementation deviation and optimization methods. *J. Zhengzhou Univ.* **2017**, *50*, 64–68, 159.
31. Guo, Z. The evolution and implementation performance evaluation of cultivated land protection policies in China. *J. Nantong Univ.* **2018**, *34*, 67–73.
32. Huang, Z. Towards equilibrium: Research on the improvement of cultivated land protection system of in China. *Academics* **2020**, *2*, 122–135.
33. Wu, Y.Z.; Qian, T.N.; Guo, Z. On the ecological compensation mechanism of cultivated land protection under the background of rehabilitation system. *J. Zhengzhou Univ.* **2020**, *53*, 27–31, 127.
34. Lichtenberg, E.; Ding, C. Assessing farmland protection policy in China. *Land Use Policy* **2008**, *25*, 59–68. [CrossRef]
35. Regulations on the Protection of Basic Farmland. Available online: http://www.gov.cn/gongbao/content/2011/content_1860862.htm (accessed on 20 October 2020).
36. Chen, B.M. Situation and counter measures for protection of arable land and basic farm lands. *J. China Agric. Resour. Reg. Plann.* **2004**, *25*, 1–4.
37. Qian, F.K.; Wang, Q.B.; Bian, Z.X.; Dong, X.R. Discussion about the permanent basic farmland planning and protection. *Chin. J. Agric. Resour. Reg. Plann.* **2013**, *34*, 22–27.
38. Zhai, W.X.; Huang, X.J. An analysis of operation effect of primary cultivated land protection system. *Sci. Technol. Manag. Land Resour.* **2005**, *22*, 1–6.
39. Wang, X.M. Institution of basic farmland protection should be perfected. *China Land* **2005**, *9*, 41.
40. Wang, W.M.; Li, B.J. A study on policy system for classified protection of prime farmland in China. *J. Nanjing Agric. Univ.* **2006**, *6*, 1–5, 52.
41. Zang, J.M.; Wang, W.M.; Li, B.J. The analysis with institutional economics on the policies changes of China's basic farmland protection. *Reform Econ. Syst.* **2006**, *6*, 84–88.
42. Zang, J.M.; Wang, W.M.; Li, B.J. Policy assessment and improvement of prime farmland protection institution in China. *China Popul. Resour. Environ.* **2007**, *17*, 105–110.
43. Zhong, T.Y.; Huang, X.J.; Chen, Y. Arable land conversion effects of basic farmland protection policy. *China Popul. Resour. Environ.* **2012**, *22*, 90–95.
44. Zhao, Y.L.; Wu, Q. A review of researches into basic farm land protection. *Sci. Technol. Manag. Land Resour.* **2007**, *24*, 30–34.
45. Cheng, G.Q.; Zhu, M.D. COVID-19 pandemic is affecting food security: Trends, impacts and recommendations. *Chin. Rural Econ.* **2020**, *5*, 13–20.
46. National Bureau of Statistics of the PRC. *60 Years of New China*; China Statistics Press: Beijing, China, 2009; p. 636.
47. Nie, Q.H.; Bao, H.S. A review and preview of prime farmland protection in P.R. China. *China Popul. Resour. Env.* **1999**, *9*, 31–35.
48. Xu, J. Research on Basic Farmland Protection Based on Land Use Function Zoning. In Proceedings of the Annual Academic Meeting of Jiangsu Land Society, Nanjing, China, 1 March 2006.
49. Feng, T.; Zhang, F.R.; Li, C.; Qu, Y.B.; Zhu, F.K. Spatial distribution of prime farmland based on cultivated land quality comprehensive evaluation at county scale. *Trans. Chin. Soc. Agric. Eng.* **2014**, *30*, 200–210.
50. Fang, X.Q.; Yin, P.H.; Chen, F.D. Changing regional differences of grain productivity in China. *Sci. Geogr. Sin.* **2009**, *29*, 470–476.

51. National Bureau of Statistics of the PRC. *China Statistical Yearbook (1981–2022)*; China Statistics Press: Beijing, China, 2022.
52. Chen, J.B.; Ni, C.M. The soil fertility compensation system brings a turning point to the development of agricultural production: Investigation of the soil fertility compensation system in Qingdun Township, Yancheng Suburb. *J. China Agric. Resour. Reg. Plann.* **1991**, *5*, 39–41.
53. National Land Administration of the PRC, Ministry of Agriculture of the PRC. Report on the Nationwide Work in Protecting the Farmland. In *Gazette of the State Council of the PRC*; General Office of the State Council of the PRC, Ed.; General Office of the State Council of the PRC: Beijing, China, 1992; Volume 3, pp. 76–77.
54. State Council of the PRC. Regulations on the Protection of Basic Farmland. In *Gazette of the State Council of the PRC*; General Office of the State Council of the PRC, Ed.; General Office of the State Council of the PRC: Beijing, China, 1994; Volume 19, pp. 828–833.
55. Environmental Protection Regulations for Basic Farmland Protection Zone (Trial). Available online: http://dara.gd.gov.cn/zcfg2295/content/post_1559184.html (accessed on 18 November 2020).
56. Technical Regulations for Delimiting Basic Farmland Protection Zone (Trial). Available online: http://zjw.sh.gov.cn/wjhb/20180912/0011-29330.html (accessed on 18 November 2020).
57. Standing Committee of the NPC. Land Management Law of the PRC. In *Gazette of the State Council of the PRC*; General Office of the State Council of the PRC, Ed.; General Office of the State Council of the PRC: Beijing, China, 1998; Volume 23, pp. 901–917.
58. State Council of the PRC. Regulations on the Protection of Basic Farmland. In *Gazette of the State Council of the PRC*; General Office of the State Council of the PRC, Ed.; General Office of the State Council of the PRC: Beijing, China, 1998; Volume 34, pp. 1279–1284.
59. Editorial office of Information for Deciders Magazine. The results of a joint survey by the Ministry of Land and Resources and the Ministry of Agriculture show that China' s basic farmland is 1.589 billion mu, and the registered areas of 16 provinces are lower than planned areas. *Inf. Deciders Mag.* **2005**, *4*, 26.
60. Notice on Delimiting Basic Farmland for Permanent Protection. Available online: http://www.mnr.gov.cn/zt/td/jbnt/zcfg/201505/t20150507_1999371.html (accessed on 18 November 2020).
61. Notice on Further Delimitation of Permanent Basic Farmland. Available online: http://www.mnr.gov.cn/zt/td/jbnt/zcfg/201505/P020180704489557485792.doc (accessed on 18 November 2020).
62. Notice on the Fully Implementation of Special Protection of Permanent Basic Farmland. Available online: http://www.mnr.gov.cn/gk/tzgg/201802/t20180226_1992874.html (accessed on 18 November 2020).
63. Notice on Strengthening and Improving the Protection of Permanent Basic Farmland. Available online: http://gi.mnr.gov.cn/202004/t20200423_2509496.html (accessed on 18 November 2020).
64. Land Management Law of the PRC. Available online: http://www.npc.gov.cn/npc/c30834/201909/d1e6c1a1eec345eba23796c6e8473347.shtml (accessed on 21 November 2020).
65. Lu, X.X. *The Western New System Economics*; China Development Press: Beijing, China, 1996.
66. Ministry of Natural Resources of the PRC. *China Land and Resources Statistical Yearbook (2005–2018)*; Geological Publishing House: Beijing, China, 2019.
67. Statistical Bulletin of China's Land, Mineral and Marine Resources (2014–2017). Available online: http://www.mnr.gov.cn/sj/tjgb/ (accessed on 21 November 2020).
68. Zheng, Y.G.; Kuang, C.J.; Jiao, H.P. A study on the causes of the evolution of the north-to-south grain transfer from the south-to-north grain transfer, and a comparison of the development advantages and consumption of grain production in North and South China. *Res. Chin. Econ. Hist.* **1999**, *1*, 97–104, 160.
69. Jiang, G.; Zhang, R.; Ma, W.; Zhou, D.; Wang, X.; He, X. Cultivated land productivity potential improvement in land consolidation schemes in Shenyang, China: Assessment and policy implications. *Land Use Policy* **2017**, *68*, 80–88. [CrossRef]
70. Zhang, J.; Feng, Z.M.; Yang, Y.Z. Study on the balance of agricultural water and land resources in Ningxia plain. *J. Arid Land Resour. Environ.* **2007**, *21*, 60–65.
71. Liu, Y.S.; Gan, H.; Zhang, F.G. Analysis of the matching patterns of land and water resources in northeast China. *Acta Geogr. Sin.* **2006**, *61*, 847–854.
72. Wang, L.X. On the situation of sending grains from the North to the South and rational utilization of water resources in China. *Agric. Res. Arid Areas* **2001**, *19*, 1–7.
73. Standard Map Service. Available online: http://bzdt.ch.mnr.gov.cn/ (accessed on 6 February 2023).
74. Resource and Environment Science and Data Center. Available online: https://www.resdc.cn/ (accessed on 6 February 2023).
75. Several Opinions on Establishing Territorial Spatial Planning System and Supervising Its Implementation. Available online: http://www.gov.cn/zhengce/2019-05/23/content_5394187.htm (accessed on 21 November 2020).
76. Guiding Opinions on the Overall Delimitation and Implementation of Three Control Lines in Territorial Spatial Planning. Available online: http://www.gov.cn/zhengce/2019-11/01/content_5447654.htm (accessed on 21 November 2020).
77. Liu, D.R.; Ma, Z.H. The relationship of "three zones and three lines" and their spatial control. *China Land* **2019**, *7*, 22–24.
78. Outline of the National General Land Use Planning (2006–2020). Available online: http://www.gov.cn/zxft/ft149/content_1144625.htm (accessed on 21 November 2020).
79. Adjusted Scheme of the Outline of the National General Land Use Planning (2006–2020). Available online: http://www.gov.cn/xinwen/2016-06/23/content_5084765.htm (accessed on 21 November 2020).

80. Rome Declaration of World Food Security and World Food Summit Plan of Action. Available online: https://www.un.org/zh/documents/treaty/FAO-1996 (accessed on 17 November 2022).
81. Hu, X.P.; Guo, X.H. Analysis and forecast of China's grain demand structure in 2020: Based on the perspective of nutrition standards. *Chin. Rural Econ.* **2010**, *6*, 4–15.
82. Lyu, J.; Wang, Y. The state of international food economy and China' s food security. *J. Part. Sch. Cent. Commun. C.P.C* **2019**, *23*, 131–136.
83. Wang, Y.; Li, D.B.; Qi, X.N. Analyses on features of modern agriculture and eco-agriculture. *Syst. Sci. Compr. Stud. Agric.* **2006**, *22*, 157–160.
84. Policy Research Office of CPC Central Committee; Rural Fixed Observation Spots Office of Ministry of Agriculture of the PRC. *Compilation of Survey Data from National Rural Fixed Observation Spots (2010–2015)*; China Agriculture Press: Beijing, China, 2017; p. 106.
85. Luo, D.; Xu, Y.; Wang, Y.P.; Zhang, F.R. Study on the method of measuring the scale efficiency of land consolidation in terms of plot size. *China Land Sci.* **2013**, *27*, 73–78.
86. Li, W.C. Function and development of facility agriculture in modern agriculture. In Proceedings of the Annual Academic Meeting of Chinese Society for Agricultural Machinery, Jinan, China, 2 September 2008.
87. Shi, J.; Zhang, N.M.; Bao, L. Research progress on soil degradation and regulation of facility agriculture in China. *Chin. J. Eco-Agric.* **2013**, *21*, 787–794. [CrossRef]
88. Notice on Issues Related to Improving the Management of Facility Agriculture Land. Available online: http://f.mnr.gov.cn/201702/t20170206_1436846.html (accessed on 24 November 2020).
89. Tao, W.X. Major characteristics of modern agriculture and the means to promote it. *Chin. Rural Econ.* **2004**, *3*, 4–12.
90. Notice on Further Supporting the Healthy Development of Facility Agriculture. Available online: http://www.mnr.gov.cn/gk/tzgg/201410/t20141017_1991335.html (accessed on 24 November 2020).
91. Notice on Issues related to the Management of Facility Agricultural Land. Available online: http://gi.mnr.gov.cn/201912/t20191219_2490574.html (accessed on 24 November 2020).
92. Xu, J.Y. Agricultural protection policy and its theoretical basis under the condition of market economy. *Acad. Mon.* **1996**, *10*, 45–51.
93. Zhu, L.L.; Cai, Y.Y.; Liu, X.Q. Impacts on farmers' welfare and its regional differences under farmland use regulation: Comparing Chengdu with Wuhan. *Areal Res. Dev.* **2016**, *35*, 143–148.
94. Department of Rural Social and Economic Investigation, National Bureau of Statistics of the PRC. *China Rural Statistical Yearbook (2021)*; China Statistics Press: Beijing, China, 2021; pp. 25–28.
95. Sun, X. China's agricultural products import surge and food security: Causes and Countermeasures. *J. Int. Econ. Coop.* **2014**, *11*, 56–59.
96. Decision on Authorization and Delegation of Land Use Approval Right. Available online: http://www.gov.cn/zhengce/content/2020-03/12/content_5490385.htm (accessed on 24 November 2020).
97. Opinions on Building a More Perfect System and Mechanism for the Market-Oriented Allocation of Factors. Available online: http://www.gov.cn/zhengce/2020-04/09/content_5500622.htm (accessed on 24 November 2020).
98. Kang, S.Z. Towards water and food security in China. *Chin. J. Eco-Agric.* **2014**, *22*, 880–885.
99. Sun, Z.; Jia, S.F.; Yan, J.B.; Zhu, W.B.; Liang, Y. Study on the matching pattern of water and potential arable land resources in China. *J. Nat. Resour.* **2018**, *33*, 2057–2066.
100. Zhao, Y.L. Statistical analysis of the changes of cultivated land resources in the past 10 years. *Territ. Nat. Resour. Study* **2020**, *1*, 53–57.
101. Wu, K.; Huang, R.J. The sustainable evaluations, the development potentialities and the countermeasures of water and land resources use in the Huang-Huai-Hai Plain. *Sci. Geogr. Sin.* **2001**, *21*, 390–395.
102. Yang, X.; Mu, Y.Y. Spatial-temporal matching patterns of grain production and water resources. *J. South China Agric. Univ.* **2019**, *18*, 91–100.
103. Xu, Y.Q.; Wu, Y.F.; Zhang, Y.Y.; Shao, X.M. Study on land use strategies in China from the viewpoint of food consumption. *China Land Sci.* **2011**, *25*, 24–29, 97.
104. Millennium Ecosystem Assessment. Available online: http://www.millenniumassessment.org/zh/index.html (accessed on 17 November 2022).
105. Zhang, F.R. New thinking of basic farmland protection. *China Land* **2019**, *7*, 20–22.
106. Wang, N.; Zu, J.; Li, M.; Zhang, J.Y.; Hao, J.M. Spatial zoning of cultivated land in Shandong Province based on the trinity of quantity, quality and ecology. *Sustainability* **2020**, *12*, 1849. [CrossRef]
107. Hanna, K.S. Regulation and land-use conservation: A case study of the British Columbia Agricultural Land Reserve. *J. Soil Water Conserv.* **1997**, *52*, 166–170.
108. Shen, J.Y.; Zhang, Q. Discussion on the mechanism of farmland protection in Canada and its significance for China's reference. *Nat. Resour. Econ. China* **2010**, *23*, 32–34, 55.
109. Chen, Y. Farmland protection in Canada. *China Land* **2003**, *10*, 41–43.
110. Su, Y.; Qian, K.; Lin, L.; Wang, K.; Guan, T.; Gan, M. Identifying the driving forces of non-grain production expansion in rural China and its implications for policies on cultivated land protection. *Land Use Policy* **2020**, *92*, 104435. [CrossRef]

111. Qian, F.K.; Wang, Q.B. Planning method of the prime farmland based on farmland classification and LESA method. *Res. Soil Water Conserv.* **2011**, *18*, 251–255.
112. Wright, L.E.; Zitzmann, W.; Young, K.; Googins, R. LESA-Agricultural land evaluation and site assessment. *J. Soil Water Conserv.* **1983**, *38*, 82–86.
113. Chen, Y.; Yao, M.; Zhao, Q.; Chen, Z.; Jiang, P.; Li, M.; Chen, D. Delineation of a basic farmland protection zone based on spatial connectivity and comprehensive quality evaluation: A case study of Changsha City, China. *Land Use Policy* **2020**, *101*, 105145. [CrossRef]
114. Cai, Y.Y.; Zhang, A.L. Researching trends of prime farmland' s economic compensation under land use planning control. *China Popul. Resour. Environ.* **2010**, *20*, 102–106.
115. Daniels, T.L. The purchase of development rights: Preserving agricultural land and open space. *J. Am. Plann. Assoc.* **1991**, *57*, 421–431. [CrossRef]
116. Wang, H.; Tao, R.; Wang, L.; Su, F. Farmland preservation and land development rights trading in Zhejiang, China. *Habitat Int.* **2010**, *34*, 454–463. [CrossRef]
117. Zhang, Q.F.; Wu, J. Political dynamics in land commodification: Commodifying rural land development rights in Chengdu, China. *Geoforum* **2017**, *78*, 98–109. [CrossRef]
118. Chen, C.; Yu, L.; Choguill, C.L. "Dipiao", Chinese approach to transfer of land development rights: The experiences of Chongqing. *Land Use Policy* **2020**, *99*, 104870. [CrossRef]
119. Guo, X.D.; Yu, Q. Discussion on cultivated land protection fund system in Chengdu. *China Land Sci.* **2011**, *25*, 42–43, 61.
120. Wang, Y. Reflection and innovation on cultivated land development rights system in China. *J. South China Agric. Univ.* **2016**, *15*, 29–39.
121. Wu, S.L. Research on the innovation of the compensation system for permanent basic farmland protection under the background of balancing urban and rural areas. *Agric. Econ.* **2012**, *9*, 90–92.
122. Niu, H.P.; Zhang, J.; Zhang, A.L. Basic problems analysis and policy path of the cultivated land protection Economic compensation. *Resour. Sci.* **2014**, *36*, 427–437.
123. Wu, S.L. Research on the construction of permanent basic farmland protection compensation system. *Rural Econ.* **2012**, *7*, 71–75.
124. Liu, C.; Zhao, B.P.; Xu, Q. Research on compensation mechanism of permanent basic farmland protection. *Auhui Agric. Sci. Bull.* **2012**, *18*, 12–14.
125. Tan, J.; Dai, Y.P. Investigation and evaluation of basic farmland protection policies. *Land Resour.* **2003**, *1*, 34–35.
126. Guo, Z.; Wu, Y.Z. Basic farmland protection system should be priority in dynamic balance system of total arable land. *J. Hunan Financ. Econ. Univ.* **2016**, *32*, 54–62.